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EDITORIAL NOTES.

Exemption of Gas Workers—Improved Outlook.

THE aspect of this question has improved since last we were writing upon it [*ante*, p. 572]; and there was room for improvement. Through the instrumentality of the Institution of Gas Engineers, the British Commercial Gas Association, and the Society of British Gas Industries, the powerful influence of Lord Moulton, Chairman of the High Explosives Committee, has been enlisted in support of the case of the gas industry in making an appeal to the Committee on Reserved Occupations. Lord Moulton, through his work in connection with the High Explosives Committee, fully appreciates that the production of benzol and toluol and other requisites to the war is inseparable from gas makes and gas sales—that all three things are interdependent. This is what we are afraid some other Departments and Committees influential in other matters affecting the war do not know; and this is where the support of Lord Moulton in regard to the representations of the industry respecting its indispensable men will be of immense value. The industry does not desire preferential treatment; it only asks that its power of serving the country and the community shall not be diminished by depriving it of men positively necessary to its work—in both the manufacturing and distributing departments.

However, while Lord Moulton recognizes the necessity of men to the maintenance and extension of the sales of gas in order to enlarge the source of the production of essentials to the making of explosives, he also feels that there is, in this matter of men, an obligation resting upon the industry; and he impressed upon the deputation from the three gas organizations that the principle that should govern the administrators of gas undertakings is not expressed by the question, "How many men can we gain exemption for?" but "How "many men can we spare for the forces of the country?" The representatives of the industry assured Lord Moulton that everything possible will be done by gas undertakings to release eligible men for service, and that to this end in all suitable occupations women will be employed, and in other occupations (in which special skill and knowledge are not necessary) men above military age, where they can be obtained. The appeal that is being made to the Committee on Reserved Occupations is to the effect that reserved gas men for exemption should be extended from "all workmen "inside the works" to "all men essential to the manufac-"ture and the distribution of gas"—wherever it is impossible to replace them by men not of military age or by women. With Lord Moulton's aid, and in view of the position of the industry in relation to the position of explosives, there ought to be no difficulty in realizing this extension, with due recognition of the principle as to the industry sparing, and not trying to gain exemption for, all the men it can.

Other kindred matters were also discussed with Lord Moulton; and in relation to certain of them the interest and assistance of the Ministry of Munitions have been secured. Where a local tribunal will not grant relief to men of military age who are indispensable to an undertaking recovering substances for making high explosives, an urgent special appeal should be made to the Ministry of Munitions, giving full details of the case, and asking for their assistance. Any attempt, too, to unbadge men badged by the Ministry of Munitions will also be resisted by the Ministry, if such men are indispensable to the undertakings employing them.

This information portrays a distinct improvement in the matter of exemption, which has been so considerably worrying those responsible for the work of the industry. But while there is powerful support behind the industry, and cogent arguments to advance in favour of every indispensable man being retained within it, there is nothing definite settled yet. Of course, the Ministry of Munitions cannot interfere with the work of the Committee on Reserved Occupations. The Ministry can advise and support representations; and such advice and support must go a very long way.

Current Work and Future Reward.

ON taking up his presidential duties last Thursday, the members of the Southern District Association of Gas Engineers and Managers gave a welcome to Mr. W. Doig Gibb which unmistakably expressed the depth of friendship existing between them and him, and the general pleasure it gave to see him occupying the chief place of honour in their midst. Although he has emerged from official life into the unfettered region of a consulting engineer, official life with him has such proximity that he can sympathize fully and sincerely with colleagues in the pursuit to-day of their official duties along the roughest road ever experienced by the gas profession, while his work in connection with the High Explosives Department of the Ministry of Munitions gives him a clearer insight than anyone outside can possibly possess as to how, in major part, the gas profession, despite the intractable commercial and working conditions with which its members are surrounded, has added, and is adding, to the current excess of daily duty by working for the country in the production of benzol and toluol. Whatever may betide in the time succeeding the war, there will be confidence, by those with investment in gas undertakings, in the officials who have steered their operations through the severe difficulties of these much-troubled days. And this confidence would be suitably marked by following the advice of Mr. Gibb, towards the close of the address, that the proper reward for the work in these times of the engineer and manager should not be overlooked. Gas engineers and managers are not bound by the service-limiting laws of trade unions, as are most of the rank-and-file of gas-workers; but a conscientious discharge of duty demands from them as much time and ability as are necessary to safeguard and promote the interests in every particular of their undertakings. Time and ability are at present being drawn upon to overflowing measure, but, just as in the case of the workmen, the claims upon the income of the engineer and manager are greater than ever they were. These are matters that should not escape notice in the right quarters.

For the main subject-matter for his address, Mr. Gibb "selected a few problems, present and future." The choice of a "few" was advisable; for if he had dealt with all the current problems that obsess the gas engineer in his wakeful hours, he would have had to convert the bright, practical, and apposite address to which the members listened into something that would have been long, and, through its length, probably less bright and less suitable. Men who are living with difficulties all day long, find conference on them most useful; but they also, when in professional meeting assembled, experience some relief by having their attention diverted to subjects, though of industrial interest, of a more congenial character. That is the line Mr. Gibb took. He drew from the experiences gained in the High Explosives Department the material for comment and advice in connection with the work of extracting from gas the maximum possible quantities, within rational limits, of benzol and toluol. At the same time, he dwelt more upon current problems than future ones. On the principle that sufficient for the day is the work thereof, there has not been much

consideration given as to the effect that current problems and conditions will have upon the industry's future. If the President had permitted himself to travel beyond the confines he set, he would have found much more to say as to how current problems affecting coal, transport, labour, residuals, &c., the demands for the raw materials for producing synthetic dyes, and other things will all have material bearing prospectively upon the industry. But limiting himself to the patriotic work that is being done, he is convinced that it is not going without its reward. We are happy to hear this. The reward at the moment is not of a very tangible order; it is really little more than the consciousness of having loyally performed a duty which only the circumstance of position thrust upon the industry.

However, the President is quite of opinion that the sacrifices gas undertakings are making at the present time will result in future in great benefit to them. We hope that the view is correct. The form he foresees it taking is expressed in the words: "With all this good work to their "credit, gas undertakings must be better recognized and "more generously treated by the Government than they "have been in the past." The gas industry itself, and the best of expert experience within it, have hitherto hesitated at the threshold of the broader operations and the larger service which a fresh step in gas treatment would offer. But where there was refusal to advance in the past, national necessity, through the war, has had effect, and has in the result created a new basis upon which to test and decide the question of the requirements of consumers of gas under present methods of its utilization. This should (as the President suggests) serve well in discussing in future with Parliamentary Committees the advisability of granting some standard which will enable consumers to be more efficiently supplied with gas on the most economical basis. In addition, it must be as obvious to our legislators as to those engaged in the work of making our country prosperous through industrial activity and expansion, that, under the conditions which the war has imposed, and which will have effect for many a year to come, no industry must leave undone anything that can be done to benefit its economy and efficiency—more particularly through its own internal resources.

This latter point especially applies to the development by the gas industry of its residual products, with the view to making the utmost of them to help to lighten the higher costs, and more arduous working conditions, which have fallen upon it through the war. The necessity for making the industry the principal source of primary ingredients for the production of high explosives for the prosecution of the war, is the best possible answer to the incipient work in nullifying, or partially so, the considered judgment of the Joint Committee of both Houses of Parliament on Gas Residual Products. The Committee saw that the economic interests of the gas industry, and therefore of the country in this respect, would best be served by maintaining open markets for residual products through the existence within the industry of the power of utilizing them to the greatest advantage. But they and no one else then foresaw how the gas undertakings of the country would, through their residual products, be of such dominant importance as they have been in a European war. Partial or complete tar distillation has been variously adopted solely through the need for the rapid provision of benzol and toluol; and from this there are likely to be developments in the way of joint distillation plants for groups of the smaller undertakings. One lesson of the war is that the extension of the number, and the greater distribution, of such plants, constitute a valuable asset to this country in times of both peace and war—in peace, in view of the extensive needs of the country for aniline dyes and colours. If ever there is further objection to the gas industry developing its own resources in the way that is considered prudent and best, there will be some evidence of a totally new character to adduce not only as to the national advantages of perfect liberty in this matter, but as to certain relationships of tar distillers and those producers who have been tar-washing their gas, and so have substantially improved the value of the tar.

The larger part of the address was not devoted to these subjects; they were only incidental to the discussion of the washing of gas for increasing the available benzol and toluol. In view of the urgent requirement for more benzol, the President made the point that it is highly desirable that administrators of gas-works should now consider whether they cannot go beyond the stage of tar-washing, and wash with oil. Of course, the scale of working is a factor in determining justification for doing this; and by those interested particulars as to what is recommended in this regard can be obtained from the sources mentioned in the address. Of course, this means the further impoverishment of the gas; but this would not matter much if carburetting oil was not so dear and scarce. That is a present drawback. Dehydrating plants and the naphthalene difficulty were among the other subjects. Concerning the latter, the President, judging from the accumulated evidence, considers that the revival of the trouble is due to the tar-washed gas (of lower vapour tension) picking up naphthalene already in the mains, and depositing it again in the smaller and presumably cooler service-pipes. In dealing with the various remedies which have been proposed and applied, the President alluded to the process of injecting into the gas atomized oil. He is of opinion that the use of air for the purpose is a retrograde step, or at any rate unnecessary, seeing that with a small gas-compressor gas could be used as the atomizing medium. Mentioning the accumulation of pitch stocks, the possibility of utilizing pitch for the firing of furnaces is submitted. On these and other points, many practical suggestions are offered; and this reference to them, we are sure, will induce gas engineers throughout the country to read the address from beginning to end. The time spent in its perusal will be amply repaid.

Carbonizing Results from Southampton.

THE principal thing that the paper proved which Mr. F. Durkin read at the meeting of the Southern Association last Thursday, is that the Southampton Gas Company did not move a day too soon in determining, in 1912, to supersede their ancient carbonizing plant and practices by modern and approved ones. The figures included in the contribution show what a very fine investment for the Company the change has been; and we should fancy that, as these figures are weighed, there must exist regrets that steps were not taken earlier to secure the advantages. But certain it is, now that there has been proof of what has long since been almost generally recognized as a fact in the gas industry—that following ancient carbonizing practices means continuation of waste, and modern practices substantial economy—Southampton will not again fall away so far to the rear of development. Mr. Durkin and the Directors of the Company are to be congratulated upon the demonstrated success of their long-deferred enterprise.

Handworked circular retorts formerly existed; one house a few years ago was fitted with De Brouwer charging and discharging machinery. The new house is equipped with horizontal retorts, which are worked by a Fiddes-Aldridge discharger-charger, and both coal and coke are handled by a telpherage system. With hand-charging, the retort-house labour costs were equal to 5d. per 1000 cubic feet; while with machine working in the new house, the cost is down to 1·21d. per 1000 cubic feet—a clear gain of 3·79d. per 1000 cubic feet. On the make per ton of coal, this 3·79d. represents a substantial sum, and multiplied by the tons of coal carbonized in the house during a year, the result (to meet capital, maintenance, and other charges) must be a startling one to the Directors of the Company. The money saving in labour is not the only advantage effected. With direct firing, the fuel used was upwards of 30 per cent. of the coke made; it is only about half this quantity now. Another notable achievement is found in the gas make and quality. Durham coals are used; they are designated in Mr. Durkin's reply to the discussion. Approximately the same coals were carbonized when a test was made with the new plant in July, 1914, as when tests were made with it in May and October, 1915. But in the first test only 12,000 feet of gas of 12¼-candle power and 510 B.Th.U. gross were made per ton. In the May and October tests, the make was up to 14,500 cubic feet of 12·4 and 13 candle power, and 508 and 510 B.Th.U. gross. It is noteworthy that (assuming the same coal) the make of gas was raised by 2500 cubic feet, without interference with the calorific quality, and with the October test actually showing an increase of illuminating power. The difference in the calorific power results per ton of coal carbonized, through the increased make of 2500 cubic feet, is the advance from 6,120,000 to 7,395,000 B.Th.U. This, Mr. Botley pointed out in the discussion, is a remarkable showing.

These figures are no doubt partly due to the arrangements which Mr. Durkin has adopted for controlling both quality and make per ton. One point as to the coke breeze. It is

found that this is rather high, through two causes—the dropping of the coke from the retorts into the telpher skip, and the immersion for quenching purposes of the still incandescent material in the outside water-tank. We pointed to this immersion being the cause of fracturing and breaking-down of coke in the early days of the installation of the telpher on gas-works. But, excepting at Liverpool, there seems to have been little or no attempt at surmounting the disadvantage. Makers of telpher plants should look into the matter a little more closely. Regarding Mr. Durkin's remarks as to vertical retorts, we need not say anything; seeing that the President (Mr. W. Doig Gibb), in the discussion, indicated that it was rather late in the day to speak as though experience with verticals had not yet been thoroughly established.

Block Concrete Purifiers.

THERE is a threatened change coming over the construction of purifier boxes. A growing disposition is apparent to build them of concrete instead of cast iron—mainly on account of cost. But in work of this kind, care has to be exercised as to conditions; and all the experience that is available is needed, so that development may have the advantage of it, and proceed on lines free from the dangers and defects already disclosed. Of course, purifier making is not the same thing as many other constructional operations on a gas-works in which concrete can be, and is, usefully employed. It is not the same even as the building of a water-tight tank; the boxes must be not only water-tight, but absolutely gas-tight. The subject was raised at the meeting of the Southern District Association in a paper prepared by Mr. W. D. Child, in which he described a set of concrete purifiers which he built for the Romford Gas Company, and which were first brought into service nearly two years ago. Economy was the chief consideration with Mr. Child, so long as he could get gas-tight boxes; and seeing that purifiers nowadays can, by proper working method, be made to run for such long periods without changing, he preferred the saving, to be effected by ground construction, of permanent capital charges to the saving of a very occasional additional charge involved through labour in the operation of changing the purifiers. There are two things, however, that Mr. Child did in the construction of his concrete boxes which do not meet with the approval of other engineers who have been making a study of the matter. Against their disapproval, however, is the fact that the Romford boxes have now been running for close upon two years; and, so far as is known, nothing untoward has developed in connection with them.

The two points over which there is disapproval are these: Mr. Child made an excavation, and built his boxes in the ground. He used concrete blocks as the main part of the structure, backing them with 9 inches of massed concrete, and surfacing the inside with "Ironite" so as to ensure gas-tightness. While concrete blocks are found to answer admirably for some constructions, in a purifier-box with gas under pressure the fewer the joints the better; the greater the number of joints, the greater the risk of leakage. Mr. A. A. Johnston, of Brentford, pointed this out in the discussion; and the President (Mr. W. Doig Gibb) and Mr. A. E. Broadberry, of Tottenham, concurred with his view that reinforced concrete is preferable, owing to its higher gas-resisting property. Even with reinforced concrete for purifiers, there is need for warning. Mr. Johnston learned the lesson by experience. It is that the work of building up the concrete must go on continuously to the finish so as to avoid weakness at the point of the amalgamation of the layers through intermittency in the work. There is a weakness at the joint when there is an appreciable lapse of time between the putting-in of one layer and the next; and this was for a time a source of difficulty at Brentford. Through the monolithic character of properly constructed reinforced concrete work, it is certain to have greater favour for purifiers (it is going to be employed for a set of large-scale elevated boxes at Tottenham) than block concrete as adopted by Mr. Child, and which gives his work uniqueness so far as purifier building is concerned.

The objection to sinking concrete purifiers into the ground is that, if there is leakage, being buried in this way, the fault will be very difficult to trace, even if observed; and to repair any defect, this could only be done when the boxes are empty. On the other hand, if the boxes are built so that their exteriors are exposed, leakage, with the gas under pressure inside, would be more easily traced. Upon this point, Mr. Broadberry lays considerable stress; and there will be very general agreement with him. There is the point as to dealing with the concrete on account of its porosity to gas. As already mentioned, Mr. Child has surfaced his boxes internally with "Ironite;" Mr. Broadberry is a great believer in the substance, from his previous experience of it for other purposes. He is going to use it on the inside of his reinforced concrete purifiers. But his own assistant (Mr. J. Fisher) asks, assuming gas-tightness with the purifiers new, is this condition going to be maintained? This question only time can answer. But we see no reason why not, seeing that Mr. Johnston does not find (and we do not understand that he used "Ironite" for internal surfacing) any trouble; and Mr. Child, with jointed blocks, does not report any difficulty. But Mr. Samuel Glover is rather concerned over the question as to whether with the "Ironite," the reactions that proceed in a purifier will not cause the preparation to perish, and render it ineffective in preventing leakage. But all these points must be determined by experience, without which development in economical construction would not be possible.

One other matter. Mr. Child in his paper gives, in detail, the costs involved in the construction of his boxes; and these will be very useful. But working them out, Mr. Johnston finds that they average 3s. 5d. per cube foot; while, for his own larger boxes, with reinforced concrete work, the cost came out to 1s. 7d. per cube foot, against 2s. for cast-iron boxes built on the ground. Mr. Johnston's 1s. 7d. and 2s. are, we take it, for a corresponding time; but whether the time compares, in point of values of material and labour, with Mr. Child's is not known. But a considerable part of the difference between the costs for the block concrete work at Romford and the reinforced concrete work at Brentford is due to the dissimilarity in the dimensions of the vessels. The whole subject of the use of concrete for purifier-boxes is an interesting one; and there is certainty that we shall hear more concerning it—the line of development being, it is fairly clear, by reinforced concrete rather than by concrete blocks.

Sulphate of Ammonia Exports to France.

THERE is such a thing as level-handed justice; but the fact seems to have temporarily escaped the attention of the Board of Agriculture. They have, in much that has been done regarding the reservation of supplies of sulphate of ammonia for home use, had negotiations with the Sulphate of Ammonia Association—the only recognized central body representing the bulk of the sulphate of ammonia produced in the United Kingdom. But now the Board have chosen the irregular course of going behind the back of the Association, and communicating direct with a few manufacturers who are overburdened with stocks of sulphate of ammonia, leading them to hope that licences for export to France will be granted. Other producers have not received the letter; and therefore the question, Why this preferential treatment, when the manufacturers have previously all been put into the same boat by the action of the Board, in their desire to mollify a certain section of the British farmers who were agitating for the total stoppage of the export of sulphate of ammonia, ostensibly in order that they might have an abundance at their disposal, but who have now shown that their action was simply a ruse to, if at all possible, pull down the price? They have not succeeded in this; and they have not absorbed the production. Hence the muddle in which the manufacturers find themselves, combined with the increasing shortage of tonnage, even if licences to export were granted. The letter of the Board of Agriculture to a few manufacturers is anyway (and more so assuming availability of tonnage for export) unfair to others who have also burdensome stocks. It is likewise unjust to those French buyers who had, before the stoppage of licences, made contracts at lower prices than those ruling to-day, and who have now a right, if ships are available, to receive consignments under those contracts, and not be mulct owing to a condition of things created largely through the Board of Agriculture lending a too ready ear to a number of discontented farmers. It is obvious that the correct order of procedure would be to first issue export licences to those who have already contracts with French buyers, and then to make the issue general. It will be seen from a communication published in another column, that Mr. D. Milne Watson, the Chairman of the Sulphate of Ammonia Association, advises makers to take action, in alternative ways, depending upon whether contracts have or have not been

made with French purchasers. In the former event, if the export merchants are in a position to ship, a request for a licence should be immediately made to the Board; in the latter event, a demand should be lodged for the resumption of the general granting of export licences.

Price of Coal under the Limitation Act.

Difficulties continue to arise regarding the fixing of prices under the Price of Coal (Limitation) Act, owing to diverse interpretations. In consequence, the Board of Trade are being kept actively engaged in connection with disputes; and the Commercial Court of the King's Bench Division will in all probability have to adjudicate on certain technical points that have been raised. A short time ago we referred to the fact that the Luton Corporation, on behalf of their Electricity Department, were in controversy with the Ibstock Collieries over the subject. The proposal was, in this instance, to charge the Corporation upon the average price for the twelve months ending June 30, 1914. But the Board of Trade has held that "the price with which comparison is to be made is not the average price over the period of twelve months referred to, but the price under an actual contract corresponding to that under which the deliveries are being made." Again, in our issue for March 7 (p. 517), allusion was made to two pronouncements that Sir Thomas Ratcliffe Ellis, in the name of the Gas Coal Federation, had secured from the Board. In certain respects, those interpretations, we believe, are to be the subject of strong protest. The sooner all these questions are settled beyond dispute the better, so that those entering into contracts may have definite principles upon which to proceed.

The Standard Addition.

There seems, indeed, little that is at present absolutely positive about coal prices, except that the standard addition to the ill-defined "corresponding price" is 4s. per ton. Even the 4s. is likely to be the Verdun against which the coalowners will, as soon as there is substantial excuse, begin a strong offensive. As references in the "JOURNAL" have previously shown, there have been rumours that coalowners were casting around for some ground upon which to appeal to the Board of Trade for an increase of the 4s. Of course, they are at liberty to appeal; but the Board of Trade know full well that the 4s. includes a respectable margin for contingencies. Only last week (p. 574), it was mentioned that the Coal Conciliation Board for England and North Wales were considering a demand on the part of the miners for a 5 per cent. advance in wages. Now the "Iron and Coal Trades Review" says: "It is anticipated that if the Conciliation Board come to the conclusion that the men are entitled to this advance, the coalowners will apply to the Board of Trade, under section 1 of the Limitation Act, for leave to charge more than the present statutory 4s. margin above the 'corresponding price' upon all inland sales." But is it likely that the 5 per cent. advance in wages will be granted if the Conciliation Board are not satisfied that the rise in the selling price of coal does not justify it? If the Board of Trade granted an additional 1s. upon the 4s., we suppose the miners would seek to get a share of it. It is a nice arrangement under which the owners, merchants, and miners all have a personal pecuniary interest in making the British public pay as much as possible for coal.

British Commercial Gas Association.

The report of the Executive Committee of the Association (of which we publish some permissible parts in other columns) is a healthy record of activity in the interests of the gas industry. The Association seem to be taking a hand in almost every matter that concerns the welfare of gas undertakings during war time. Perhaps it is as well that the Institution of Gas Engineers, the Association, and the Society of British Gas Industries have formed a sort of coalition, to deal with problems where authority has to be approached or its sanction secured. Unity is strength; and though the interests represented by the three organizations are many, they all converge to the one point of the common good. But we must confess that it strikes us as rather strange to see such matters as naphthalene, sulphate of ammonia, sulphuric acid, and coal receiving prominent mention in the report of the Executive of the Association. They are subjects that we should have looked for in a report issued by the Institution. But mention of them in this report from the Association (among such topics as finance, use of gas in munition factories, and labour) is due to participation in attempts to obtain improved conditions in respect of them, and to the fact that they all bear upon the question of the price of gas.

Present Lines of Operation.

Regarding the ordinary functions of the Association, we are glad to learn from the report that, the war notwithstanding, new subscribers are coming in, and that the subscribers generally are showing their faith in the utility of the work by sending in their contributions in a manner that is highly encouraging to the workers. As to publicity work this year, the Committee are paying close attention to factory and workshop lighting, in view of the issue of the report of the Committee on Factory and Workshop Lighting; and water-heating appliances are also to have prominence. The makers of the latter have given the Committee an assurance that they will be able to supply requirements, unless unforeseen contingencies disturb their operations. "Unforeseen contingencies" have unpleasant frequency in these times. The Industrial Fuel Committee which has been appointed should also do excellent work. The portions of the report published by us do not divulge all the work undertaken by the Association. A list of subjects upon which information has been sought from the Association by subscribing undertakings, has a variety and a range that are astonishing. That answers were available for all the inquiries is a testimony to the depth of the available resources. The Association have also been directing attention to ancient misconception as to the uses of gas that is to be found in works that are accepted as standard ones. They seek correction; but no correction which cannot be justified by demonstration. There is strength in this attitude. The activities of the organization, like a thriving tree, burst out into new branches here and there. It is all to the good of the industry.

Gas Supply of Sheffield.

In face of a curtailment of the public lighting, the quantity of gas sold by the Sheffield United Gaslight Company last year was 5¾ per cent. more than that disposed of in 1914; while within the last four weeks over 60 million cubic feet of gas have been consumed in excess of the corresponding weeks of last year. These are big figures—so big, in fact, that at the annual meeting of the Company, the Chairman was impelled to say it could be wished, owing to the difficulties in getting coal, that the inhabitants would practise more economy in gas consumption. The results are excellent evidence that Sheffield is satisfied with its gas supply, and will perhaps convince the Engineering Correspondent of the "Sheffield Daily Telegraph" that the Directors are pursuing a sound policy in placing the ordinary domestic consumers on one footing as to price, instead of introducing a graduated scale of charges—which the Engineering Correspondent has urged is necessary to prevent electricity from becoming "first favourite." One can agree that the times are changed without at the same time agreeing that "gas has no longer the monopoly it had for light and power." A statutory undertaking still has a monopoly of the sale of gas, which is the only monopoly it ever did have. But that perhaps is taking too narrow a view of the meaning to be attached to the Engineering Correspondent's remark; and this we have no wish to do, for he has dealt with the subject courteously, and has frankly recognized that the price of gas in Sheffield has always been low—thanks (in addition to favourable situation) to good management. This is the gist of our own contention—that the price of gas is low to all, and that therefore reasonable cause for complaint, or for a change in the system of charging, does not exist. Sheffield, as is admitted, owes much to its Gas Company, which is an outstanding example of that beneficial private enterprise of which there are so many instances to be found in the industry. In spite of the picture of the possible result of municipalization which the Engineering Correspondent proceeds to conjure up, we doubt, with all respect, whether any municipal councillors would prove more public spirited than the Directors of the Company have shown themselves to be.

Reported Travancore Thorium Development.

It is stated, on authority which we have hitherto found reliable in connection with the Indian monazite sand question, that the Travancore Minerals Company are contemplating erecting a factory for the production in this country of thorium nitrate. If this is true, it has, it appears to us, an important bearing on the

conditions laid down by the India Office as to the future working of the Company. In fact, the proposal looks very much like a means of protecting the profits of those who hold the major part of the capital, and, owing to the preferential conditions under which the Company would be working, of jeopardizing the commercial manufacture of nitrate of thorium by all other British makers, who, relying upon the terms imposed upon the Company by the India Office, may put down the necessary plant and purchase Travancore sands for the purpose. It will be remembered (or, if not, memory can be refreshed by consulting our issue for Aug. 10 last) that, after the agitation, largely through our columns, over the feeding of a Company in Berlin with the monazite sands from Southern India, while there was no sand available here for producing thorium nitrate, it was discovered that a large proportion of the capital of the Minerals Company was held, through the General Electric Company, by the German Company. The terms imposed for the future working of the Travancore Company were intended, among other things, to break-down the German control. Another condition was that the Travancore Company should give a formal undertaking that they would be ready at all times to sell monazite sand direct and at a fair price to *bonâ fide* British firms, without giving preference to large buyers. It comes to this that, if the report is correct as to the Travancore Company commencing the manufacture of thorium nitrate in this country, their position in relation to the monazite sands is such that, although they are bound to supply other British thorium nitrate makers, they would be able to effectually cut them out of the market, and so preserve the profits to the ultimate benefit of the German Company. At any rate this seems to us to be the position; and it certainly appears as though, in this way, the intentions of the India Office in making the conditions they did would be frustrated, and in the sweet by-and-by the Berlin Company would, through the proposed development, reap profit from the sale here of the thorium nitrate. It is well the British gas industry should understand what would be the effect of this reported prospective move. Such a move, it seems clear, was not foreseen by the India Office.

Science and Industry in Australia.

A Commonwealth Institute of Science and Industry (under the control of directors possessing the highest business and scientific attainments, acting with the advice and co-operation of a council), representing science and the primary and secondary industries of Australia, has been recommended by a Committee in a report which has been approved generally by the Cabinet. The report is, as a matter of fact, the outcome of the labours of a Committee appointed, as the result of a representative conference convened by the Prime Minister of the Commonwealth, for the express purpose of formulating a scheme for the application of science to industry. Feeling, as the result of their investigations no doubt that the fruits of scientific research into industrial problems would amply repay considerable expenditure, the Committee decided on an Institute, assigning to it the following, among other, functions: To consider and initiate scientific researches in connection with, or for the promotion of, primary or secondary industries in the Commonwealth; the collection of industrial scientific information and the formation of a bureau for its dissemination among those engaged in industry; and the establishment of national laboratories. Being desirous that immediate action should be taken, the Committee put forward suggestions, which the Cabinet have accepted; and in accordance with these, an Advisory Council will be appointed particularly to carry out, until the Institute is established, the first two of the three objects just mentioned. Educational and other public bodies, and private enterprises, will, too, be invited to suggest directions in which investigation would be of immediate practical use to producers and manufacturers. The proposal is one which will be carefully watched outside the Commonwealth. The new organization will not have an idle time, for the list of problems already suggested as urgent is quite formidable.

Last November it may be remembered an advertisement appeared in the pages of the "JOURNAL" in regard to the appointment of an Assistant Engineer for the Australian Gaslight Company. We have just learned, through the London Agents, Messrs. William Coward and Co., Limited, that a cable received from Sydney intimates that, after much consideration, the Board of the Company have decided to appoint a local candidate.

PERSONAL.

Having been selected to fill a vacancy, Mr. JACQUES ABADY'S services will again, as a member of the Westminster City Council, be devoted to the interests of the ratepayers.

OBITUARY.

The death has occurred, at a Leeds nursing home, of Mr. THOS. WORMALD, for a long period of years Engineer and Secretary to the Rothwell Gas Company. He was 69 years of age.

The death occurred, from apoplexy, on the 15th inst., at Finchley, of Mr. WILLIAM GALBRAITH, who was for many years Manager of the Ardrossan Corporation Gas-Works. Deceased was in his 81st year; and it was in 1910 that Mr. J. D. Keillor was appointed to succeed him at Ardrossan. For some years previous to that, Mr. Galbraith had had associated with him in the managership Mr. J. Mitchell, who was ultimately appointed Assistant Manager at the Dundee Gas-Works—leaving Mr. Galbraith again sole Manager.

SULPHATE OF AMMONIA FOR FRANCE.

A Question as to the Issue of Export Licences.

THE following letter regarding the above subject has been circulated by Mr. D. Milne Watson, the Chairman of the Sulphate of Ammonia Association:

It has come to our knowledge that a few manufacturers who are over-burdened with stocks of sulphate of ammonia have received a letter from the Board of Agriculture leading them to hope that licences for France will be granted.

This is manifestly unfair to those manufacturers who also have heavy stocks, but have not received the letter. In view of this, we wish to point out that the bulk of the business for France has already been contracted for by the usual export merchants and by the few manufacturers who have direct connections in France. Many of these contracts were made at much lower prices than the present, so that the action of the Board of Agriculture will mean great hardship to French buyers who have cheap contracts.

Quite apart from this, only very limited tonnage is now available for France from one or two ports in the United Kingdom; and the Board's letter, in a large number of cases, will therefore merely serve to raise false hopes, as the sulphate could not be shipped even were a licence granted.

Under the circumstances, we would advise you to confer immediately with the export merchants to whom you may have sold, as to whether they are in a position to ship to France, and, if so, to communicate with the Board of Agriculture requesting that a licence be granted. If you have not sold, it would be better to demand that the general granting of licences should be resumed, because the quantity required by France is only limited, and the season already very far advanced in that country.

Export Prohibitions.—A Supplement to the "London Gazette," dated Thursday last, stated that on and after March 27 the exportation of manufactured fuel would be prohibited to all destinations abroad other than British Possessions and Protectorates. The exportation of ramie stockings and ramie fabrics for the manufacture of gas mantles is also prohibited to all destinations abroad other than British Possessions and Protectorates.

Production of Petroleum in Trinidad.—The year ending March 31, 1915, was, according to a Colonial Office report, a satisfactory one for the companies engaged in winning petroleum in Trinidad and Tobago. The amount of oil produced during the twelve months was 14,230,871 Imperial gallons more than in 1913-14; the figures for the last three years having been as follows: 1912-13, 17,626,563 Imperial gallons; 1913-14, 22,523,060 gallons; and 1914-15, 36,753,931 gallons.

Midland Association of Gas Engineers and Managers.—Apart from the formal business to be transacted at the annual meeting on Thursday, and the address of the new President (Mr. C. H Webb), the agenda arranged by the Hon. Secretary (Mr. W. G. S. Cranmer) intimates that "notes will be contributed" by (1) Mr. John Bond, on "Benzol and Toluol Extraction by American Gas Oil;" (2) Mr. Hubert Pooley, on the "Extraction of Benzol and Toluol by Green Oil;" and (3) Mr. George Stevenson, on "Carbonization and Toluol Extraction."

Coke-Breeze for Boiler Heating.—Mr. H. W. Bowden, referring to the use of coke-breeze under the boilers at the South Metropolitan Electric Light and Power Company's station, mentioned at the Company's meeting recently that the results obtained over a period of nearly twelve months showed a considerable saving, notwithstanding some excessive repairs due to design and stressed conditions. Although, owing to the demands on the plant, the experiment had been abandoned, he saw no reason to prevent the exclusive burning of coke-breeze (unassisted by coal) in a boiler-house properly designed and ventilated. This, he said, was important when using forced draught with a sulphurous fuel.

ELECTRICITY SUPPLY MEMORANDA.

THE Institution of Gas Engineers has not given harbourage among its ordinary members to men who can now be described as alien enemies. There are among the honorary members two or three names of famous men who are German and Austrian subjects. But the reasons for which they were elected to honorary membership stand as good to-day as on the day of their election. The members of the Institution, therefore, have no cause to trouble their heads over the expulsion or retention of alien enemies. But the Institution of Electrical Engineers has found itself almost rent in two over the subject of expulsion—on the one side being ranked the moderates, and on the other side the extremists. The matter has been discussed at meetings of the members; and the proceedings were long and some of the views strong. The Council submitted a resolution providing an addition to the Articles of Association for the exclusion at any time from any class of membership of any person who is the subject of an enemy country. But when the proposal was under discussion, a section of the members seemed to think the rules should be altered so as to include beyond those members who are not naturalized in this country, those who are naturalized here, but are not denaturalized in the country of their birth. This is taking a stride over the bounds of necessity, and perhaps of what is legitimate. The "Electrician" understands that the law as to denaturalization was only introduced into Germany in 1913; and, under this circumstance, there would be men, whose native land is Germany, who have spent many years as naturalized British subjects, and have an honoured record, but who have not, after having been naturalized here so long, seen since 1913—even if they had had the opportunity of taking the required steps—any necessity for becoming denaturalized in Germany.

Electrical Alien Enemies.

On this naturalization question we have always retained the view that at heart a Britisher could never be anything else than a Britisher; and, tested by the British standard, a German at heart could never be anything else than a German. Of course, honour comes in, and the oath of allegiance would be binding on some Germans, but we cannot say this for all. There are such things as "scraps of paper." However, when a man becomes legally naturalized, he can claim the right to legal treatment; and it is therefore very doubtful whether a man who has become naturalized in this country could be expelled from any technical Institution or Association. The matter might be somewhat different were the organization a purely commercial one, and the "naturalized" subject known to be merely the agent in this country for German goods or for developing German business interests. There would then be substantial reasons affecting the trading interests of this country for asking such a person to "make himself scarce." However, the Institution of Electrical Engineers, unable to arrive in meeting assembled at a unanimous conclusion, have decided to take a postal vote of the members on three aspects of the subject: (1) Expulsion of members who are subjects of enemy States: (2) expulsion of naturalized British subjects who have retained enemy nationality; (3) rendering ineligible for membership the subjects of enemy States after the war. If aspect No. 2 obtains a preponderance of votes, there will then be the legal tangle to deal with; but the fact that the point is being put to the vote shows how in the electrical industry—and it is the same in others—the inhuman methods of warfare adopted by Germany have created a deep-rooted and far-reaching desire to banish as far as possible from our midst all that is German, and all those who, born in Germany, have not already completely detached themselves from it.

Legality and a Vote.

Several electricity supply stations are using coke or coke breeze for steam-raising in this difficult fuel-procuring time. This is largely due to the energetic work of the fuel expert of the London Coke Sales Committee (Mr. E. W. L. Nicol), and the balance of credit can be entered up to the difficulties of obtaining coal supplies. It is a good thing that this experience has come along, as, in the electrical industry, there formerly existed a good deal of scepticism and misconception regarding the use of coke. But this was due to want of experience; and that want is no longer present in some very substantial electricity supply stations. The South Metropolitan Electric Light and Power Company are among those who have had experience of mechanical firing with coke breeze. To the matter, Mr. H. W. Bowden, the Engineer-in-Chief, made allusion at the recent meeting of the shareholders. As an economic proposition, he had nothing but good to say regarding it. The trial has been running nearly twelve months; and the results show a "considerable saving," notwithstanding "the excessive repairs and attendance required." Mr. Bowden attributes these drawbacks, which, however, are compensated for in the final economy, partly to design, and partly to the stressed conditions under which working has been carried on, due to the late delivery of plant. But for the time, owing to the heavy demands on the station, the trial has had to be abandoned. However, he sees no reason why there should not be exclusive burning of coke breeze in a boiler-house designed for the purpose, and well ventilated. This, in his view, is important when using a forced draught, and more particularly so with sulphurous fuel. This last point is interesting, but not very clear, because the coke does not contain such a large percentage of sulphur as the original coal—the sulphur content of the coal being distributed through various carbonization products. Mr. Bowden is looking forward to continuing the trials, when there is an easing of the demand at present experienced upon the station plant.

Coke Fuel at Central Stations.

The Royal School for the Blind at Leatherhead requires a large steam-boiler plant in connection with its heating system. Having a steam-boiler plant, a development has been a private electricity generating plant; and, having this, and desirous of getting as good a load as possible for it, a further development has been an electric cooking installation. As the cooking is a day load, it is stated that there has been no material increase in the fuel consumption; and so it is claimed that there has been a clear saving of upwards of £80 per annum as a result of the change-over from gas to electricity. The pre-war rate for gas is, in the article on the subject in the "Electrical Times," placed at 3s. 8d. per 1000 cubic feet, which figure, it is believed, has since been increased. No details are offered as to the actual cost of the electric current consumed for cooking; perhaps it would be difficult to give them with a steam-generating plant always required for other purposes, and an electricity-generating plant gasping for more breath in the way of additional work. However, the equipment comprises a large cabinet-type roasting and baking oven, a treble-oven range with boiling-plates, a large grill, and an electric stock-pot. Loaded at full heat to 12 KW., the large oven accommodates upwards of 2 cwt. of meat at a time; the average weight cooked being about 130 lbs. Now all cooks know that the boiling operations in the preparation of food and for general kitchen purposes are at least three times greater than those in which baking and roasting are concerned; and so it is not surprising to learn that the electrical method has not been adopted for boiling. There are three steam-heated boiling-pans, and a large hot cupboard is heated by the same agency. Regarding the consumption of the electric-cookers, it is mentioned that these had been in daily service since June of last year; and during the 227 days up to Jan. 31 last, the current consumption totalled 6853 units, giving a daily average of 30·18 units. The average number of persons cooked for daily, including staff and inmates, is no fewer than 250; so that the consumption is only 0·12 unit per person per day. This is, of course, accounted for by the fact that no great variety of dishes is prepared every day, although large quantities of food are called for to meet the needs. The "Electrical Times," in its article, does an injustice to the cooks of the establishment, simply owing to its ardour in the cause of electrical operation. Speaking of the oven, it says: "A sliding drawer in the base collects the fat, which, instead of being black and burned, *as it would be with a gas-oven*, is perfectly white and pure, and is made use of in the kitchen." Why "would be with a gas-oven?" Fat is not blackened or burned in households with which we are acquainted; and why should the cooks at the Leatherhead Royal School for the Blind be behind other cooks in their manipulation of a gas-oven. Then, again, it is stated that "the cooks find there is a substantial saving in the weight of meat with electric cooking." We know of cooks who have failed to find this difference. Why should they, given cooking at equal temperatures?

Electric Cooking from a Private Generating Plant.

These are days when, in the cause of economy and war financing, we are asked to be frugal, to eschew the little luxuries that we were wont to indulge in in peace times, to give up unnecessary pleasures—including theatres, music halls, motor car trips, and dining at hotels and restaurants when home is handy—and to wear our old clothes, even though our trousers have become baggy at the knees and our coat sleeves a bit rubbed and otherwise showing signs of hard wear. We are trying to follow the prescription in spirit and to the letter—out of loyalty to our country. Probably there are many of the residents at Worthing who endeavour to do the same. We trust and expect they are; and while they are shunning all forms of extravagance themselves, it is to be hoped they will not encourage the—more so to-day than ever—unpardonable vice in others. The inhabitants of Worthing have been asked to subscribe £58 10s. to the banishing of gas from, and the fitting-up of electric light at, a place called "The Grange"—is now a convalescent home for wounded soldiers. Mr. Sidney O. Stephenson, the Engineer and General Manager of the Worthing Gas Company, entered a protest in local papers against this unnecessary expenditure, when money is badly required for other more important matters, and when, to win the war, the source of the supply of high explosives must not be in any way depreciated, but must be enlarged to the utmost extent. Above all places in which nothing should be done to lessen the source of supply is a home for wounded soldiers—probably many of them wounded through the large provision of high explosives that the Germans had made prior to the war, and are still making from the gas and tar resulting from the carbonization of coal. The Germans are urging their people to burn less coal and more gas and coke. The persons who want to banish gas from "The Grange" at Worthing, and put in electric light, are working to the contrary end—they are playing into the hands of the enemy; they are, in short, con-

Wounded Soldiers and High Explosives.

tributing to the production of a shortage of the very substances with which the Germans are so well supplied. They may plead that their proposal only means a very small difference. If all those who control small differences argued the same, what then? At the beginning of the war, this country, to its everlasting disgrace, had only a few tons of toluol in hand; but the nation's thanks are due to the gas undertakings for the energetic manner in which they came to the rescue to save the British Armies and Navy, and the country from a defeat that would have been humiliating and disastrous to the nation, and would have placed practically the whole world at the mercy of the most despotic of Powers. Ignorance goes a long way in shaping actions. Whatever is the result of the newspaper warfare at Worthing, Mr. Stephenson has had no difficulty at all in presenting a case full of cogent, telling argument. But he is not an intolerant ultra-prejudiced controversialist. "The selection of an artificial illuminant," he writes, "is a matter for each individual's choice. But this is not an ordinary time." True, and the country's interests, (not personal inclinations, fads, and fancies) must—at any rate, for the time being—come first.

The Electric Furnace.

An article in "Electrical Engineering" tells the reader that the electric-furnace is making progress in the Sheffield steel trade; but the extent of the progress is not numerically attested. The progress, we gather, is not due to the war so much as to the intrinsic merits of the electric furnace. Steel manufacture depends for its success on the complete elimination of all impurities from the raw material fed into the furnace; and it is claimed that the electric process permits the refining and purifying of the material to operate "to a much higher degree than is possible in the older furnace." The note of praise continues: "It is in rendering the difference between excellence and super-excellence possible . . . as a regular process repeatable at will that electricity has taken the manufacture of high-class steel one stage further." Then, again, the demand for superlative qualities of steel has been so well met by the electrical method that to-day it holds an assured position in the industry. In view of the success of the gas-furnace in the metal industries—gas-furnaces dealing with tons per charge as well as pounds and ounces—we cannot find heart to begrudge the electric furnace an amount of useful application. But the claims strike us as being rather too general, and not sufficiently specific. The information is given that the Héroult type of furnace is much in evidence in Sheffield; the one manufactured by Electro-Metals, Limited, is also in favour; while there is "one" sample of the Rennerfelt furnace in use. We cannot describe the furnaces in detail. But it may be said they are all of the arc type, but differ in the manner of applying the arc. The Héroult furnace consists of three electrodes each carrying one phase; the current passes through the electrodes, to and along the surface of the metal in the furnace. In the type introduced by Electro-Metals, Limited, a two-phase connection of the three-wire type is used. The "A" and "B" phases are attached to vertical electrodes, which are lowered into contact with the charge in the furnace. The common return lead is connected to the bottom point of the furnace beneath the basic lining. This bottom electrode consists of a layer of a mixture composed of tar, dolomite, or magnesite. The lining is burnt in, and when hot is said to be a good conductor. The object of the design is to obtain the benefits of a bottom heat on to the charge. The Rennerfelt furnace strikes the arc above the charge, and then deflects it upon the surface of the metal. This furnace is worked by two-phase current, and three electrodes. All three types work with low-pressure current; control being obtained by varying the arc between the electrodes; while for the different purposes of the initial heating and the refining stages, control is available by alteration of the voltage at the transformers. It is claimed that the electric furnace removes every trace of sulphur out of the steel, and thereby raises its quality; and so, in the end passages of the article, we arrive at the conclusion that the trend of events "seems" to indicate a very important future for the electric steel furnace.

Murdoch Lodge.

The installation meeting of the Murdoch Lodge was held last Thursday at the Imperial Hotel, Temple Street, Birmingham, when W.Bro. Sidney O. Stephenson installed his successor in the chair, W.Bro. Captain S. P. Thornton, P.M. 2702. The following officers were subsequently invested:

Senior Warden	Bro. Harold Eveson
Junior Warden	,, W. J. Rendell Baker
Chaplain	W.Bro. Luke B. Taylor
Treasurer	,, Fred Vale
Secretary	Bro. Frank Jervis
Charity Steward	W.Bro. Vincent Hughes
Senior Deacon	Bro. H. J. Woodfine
Junior Deacon	,, C. H. Webb
Director of Ceremonies	W.Bro. T. E. Vale
Assistant Director of Ceremonies	,, W. A. Sapey
Organist	Bro. H. V. Stanton
Assistant Secretary	,, Lieut. Robert Scott
Inner Guard	,, W. M. Valon
Senior Steward	,, Forrester Clayton
Junior Steward	,, Major W. R. Glover

FUEL ECONOMISTS.

By W. J. A. Butterfield, F.I.C., Assoc.Inst.C.E.

[*Continued from p.* 578.]

The Large Gas-Engine for Power Stations.

The alternatives to present practice fall into two groups, both of which involve preliminary gasification of the raw coal. The first group covers the gasification of the coal and the consumption of the resultant gas in internal combustion engines. At the present time, the engineering advisers of large power undertakings are unable to recommend the adoption of internal combustion engines for power station work. Greater reliability and greater efficiency of large gas-engines are necessary; and as experimental work and research in this direction are extremely costly, it is a question whether a Committee constituted by makers of gas-engines and large power producers should not be formed to undertake the development of large units of the internal combustion engine. Whether the power producers alone should provide the funds, or whether in a matter of such national importance the Committee would not have a reasonable and independent claim on the Government for a substantial grant in aid of the work, is debatable. If, however, any funds, whether derived from the suggested tax on exported coal or otherwise, are provided by the Government for furthering the cause of economy of fuel, there is no question that a considerable proportion of those funds should be ear-marked for the development of the large gas-engine.

Unfortunately investigation and development of the gas-engine have of late been neglected, owing to the more insistent claims of users of petrol and heavy-oil engines; but it should be remembered that the available supplies of coal, even in Great Britain alone, will suffice to produce gas of a potential value for power production far in excess of that of the whole world's known oil-resources. The development of the large gas-engine is work in which the chemist should take a leading part; but the modern tendency of those responsible for the education of chemists in our universities and colleges to despise the worth of a comprehensive training in inorganic chemistry and physics, leaves us with few chemists of the present generation competent to collaborate to any purpose with the mechanical engineer in industrial work of this kind. The engineer, left to his own devices, is by nature an empiric (in the best sense of the word) while the organic chemist in ninety-nine cases out of a hundred busies himself with the minor problems to deal with which alone he has been properly equipped. The major problems of chemical industry—such as the combustion to the best advantage of gas in the internal combustion engine—are consequently solved very tardily. Yet in the solution of this and kindred problems, there is better prospect of effective economy of fuel than in the greatest triumphs of the organic chemist in the synthesis of colours and drugs from the constituents of tar, though it is on tar that the theorist in fuel economy generally harps.

Gaseous Fuel for Boiler Firing.

Pending the improvement of the large gas-engine, we are left with the second alternative to the consumption of raw coal for the generation of steam. This alternative consists in the gasification of the coal and the employment of the products of gasification for generating steam. There are three ways in which this alternative may be varied, viz.:

(1) Complete gasification, in one operation of bituminous coal, to form a fuel gas, such as is yielded by Mond, Duff, or Kerpely producers, and the use of the gas as boiler fuel.
(2) Carbonization of the coal, and the direct employment of the resultant coke as boiler fuel, with or without the use of the resultant coal gas also as boiler fuel.
(3) Carbonization of the coal, gasification in a producer of the resultant coke, and the employment of the producer gas, with or without admixture with the coal gas, as boiler fuel.

The first and last of these variations involve the use of gas as a boiler fuel, and the second may do the same partially. It is therefore useful to inquire how the evaporative duty of gaseous fuel compares with that of coal or other solid fuel. Apart from the pioneer work of Professor Bone, who is no mere theorist in fuel economy, there is comparatively little definite information available as to the efficiency attainable in the firing of large boiler units by gas. The most definite published statement relating to fairly large units in every-day working, of which the writer is aware, is by Mr. H. A. Humphrey, who stated, in the paper on "The Generation and Distribution of Producer Gas in South Staffordshire" which he read before the Institution of Civil Engineers in 1912, that a test of gas firing of the Lancashire boilers at Dudley Port, lasting 40 hours, showed a "heat-efficiency, as between calorific value of gas and heat in steam generated, of 79·1 per cent." This figure, of course, compares favourably with the efficiency obtainable from coal, and is especially valuable, because it was obtained from a type of boiler in general use with only a comparatively small and simple addition to adapt it for the use of gaseous fuel. It is appreciably lower than figures obtained by Professor Bone and others in special trials or smaller scale working with specially equipped boilers;

and there is no doubt from these figures that an every-day efficiency of as much as 90 per cent. from gaseous fuel is not altogether beyond expectation in the future. But it is certain also that the maximum efficiency in the firing of boilers with raw coal has not yet been attained. Paying due regard to the advances which will inevitably be made in the firing of boilers with both types of fuel, and to the differences between the results of efficiency trials and every-day working, it may be anticipated that the heat efficiency, as between calorific value of the fuel and heat in steam generated, will never be much more than 15 per cent. higher for gas than for raw coal, when both are used by the best available method as fuel for large boilers. The difference will often be appreciably less; but it should always be in favour of gas.

Bituminous-Coal Producer Gas.

The simplest method of gasifying coal for the production of a power gas for firing boilers is by means of the Mond or other suitable producer, with or without recovery of the ammonia from the gas before consumption. It is not, however, a method which will appeal to Professor Armstrong and most theorists on fuel economy, because such tar as is produced is not rich in benzene or the other hydrocarbons on which they set a sentimental value out of all proportion to their commercial value in normal times. A large part of the nitrogen in the coal may, however, be recovered in the form of ammonia—in fact, in some cases the gas becomes a bye-product, of which a large proportion is completely wasted; the producers being worked primarily for the manufacture of ammonia from bituminous slack. Whether (to quote Professor Armstrong) this is "provident utilization of the abundance" of combined nitrogen in coal, as compared with the consumption of coal at Ludwigshafen for the direct production of ammonia from atmospheric nitrogen is a question of practical significance which may be commended to the attention of theoretical fuel economists. There seems no reason, however, why, in suitable local conditions, the same coal should not be utilized in both directions, and a double return of ammonia obtained from it. One locality occurs to the writer where such a procedure should have an assured success, even if the general market value of sulphate of ammonia fell to the lowest figure hitherto experienced.

In cases, however, where the producer is primarily required for gas production, and its working is controlled according to the demand for gas for firing the boilers in a large power station, the ammonia is a bye-product which may or may not be worth the outlay for its recovery. The paper by Mr. H. A. Humphrey, already referred to, gave figures on the working month in and month out, of the Mond producer plant at Dudley Port, from which some interesting deductions can be drawn. It appears that the average yield of sulphate of ammonia from coal containing 1·16 to 1·19 per cent. of nitrogen was 81 lbs. per ton; of tar from coal containing 35·3 to 36 per cent. of volatile matter 190 lbs., or (say) 17 gallons, per ton; while the calorific value of the gas made represented about 64·5 per cent. of the calorific value of the coal gasified. The gas manufactured includes that used for firing the boilers and other purposes on the works; and the calorific value of the gas sold by the South Staffordshire Mond Gas Company appears to have represented only about 48·7 per cent. of the calorific value of the coal gasified. If the approximate calorific value of the tar is added to that of the gas sold, the percentage in the gas and tar of the calorific value of the coal gasified is about 59·5 per cent. Since, however, power was in this case used for distributing the gas, and for cleaning it more thoroughly than would be necessary if it were merely required for boiler firing on the spot, it is not right to take so low a figure as representing the probable thermal efficiency of Mond producer plant if installed in connection with a large power station. But this figure does gives some indication of the proportion of the calorific value of the coal which would be "wasted"—to use the word of the theorists—if coal were gasified by this method at the pit-head and the gas distributed thence to industrial users. For boiler firing, even allowing for a greater evaporative efficiency from the gaseous fuel, such distributed gas could hardly compete with raw coal used directly in a modern boiler plant.

The gas made at Dudley Port, however, represented less than 65 per cent. of the calorific value of the coal gasified, without deduction for the gas consumed in the work's boilers. If to this figure there is added the calorific value of the tar produced, we get approximately 75 per cent. of the calorific value of the coal gasified recovered in the gas and tar. It thus appears that the actual loss in heat units entailed in the gasification of coal by this method is about 25 per cent. Looking at the matter in another way, the consumption of 25 per cent. of the calorific value of the coal may be regarded as the coal equivalent of the recovery of 81 lbs. of sulphate of ammonia from a ton of coal. The figure of 75 per cent. for the thermal efficiency of the Mond producers at Dudley Port is very near that obtained in an efficiency trial in 1911 of Kerpely producers consuming coke breeze at the Corporation Gas-Works at Vienna. These producers require no separate boiler installation; and the proportion of the calorific value of the coke which was recovered in the gas available for use—viz., 75·37 per cent.—is therefore clear of any deduction for gas or other fuel used for steam production for the service of the producers. In the Dudley Port installation of Mond producers, the 75 per cent. efficiency is subject to a deduction, which cannot be exactly estimated from the figures published by Mr. Humphrey, under this head.

From the foregoing figures, it may be inferred that it is possible to gasify bituminous coal in Mond or Kerpely producers with a loss of about 25 per cent. of its calorific value. This means that if the gas and tar are used as boiler fuel with an evaporative efficiency of 85 per cent., less than 65 per cent. of the calorific value of the coal is actually utilized in the generation of steam. This is certainly no better than the evaporative efficiency of raw coal; and the only asset of the gasification process is about 70 lbs. of sulphate of ammonia per ton of coal for every 1 per cent. of nitrogen in the coal. This yield of sulphate of ammonia has to pay for the cost of the sulphuric acid contained in it, for the labour and other working expenses of the producers, ammonia recovery, and sulphate plant, and the interest and depreciation charges on the whole of the plant. Even with cheap sulphuric acid and a good market price for sulphate of ammonia, it will be fairly evident to gas engineers that the ammonia recovery will not pay these expenses and charges. It would appear, therefore, that a very much higher efficiency than 75 per cent. must be obtained from this type of producer if it is to compete in equal conditions with raw coal as a fuel for large boiler installations. There are, of course, cases in which, with a producer of this type, a poor grade fuel, which would not serve very well for the direct-firing of boilers, may be utilized; but these are outside the general question, raised by the theorists, of the abolition of the use of raw coal.

(*To be continued.*)

WASTE OF COAL AND COAL PRODUCTS.

DEFENCE OF THE OPEN DOMESTIC FIRE-PLACE.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

A not unusual failing on the part of a full-fledged University Professor of Science, qualified to string half the letters of the alphabet, after his name, is a rather senseless contempt for established methods and procedure and for the practical man who can claim nothing beyond a full stop. Yet the fact remains that, although the professor has done much towards the advancement of applied science, the practical man has done more. The spread of education has had the effect of bringing the two classes more intimately into contact, led to the cultivation of a mutual respect, and to a realization of the fact that each has its proper place under the sun, and is in a sense complementary to the other. But the old-fashioned academical prejudice has not yet died out; and in no instance is this more evident—not even as regards the gas industry or the gas engineer—than in that of the open fire-grate, so dear to the heart of every Englishman, which has been unsparingly condemned, both by the scientific voice and the scientific pen, for the last half century. But it is yet going strong to a sufficient extent to warrant consideration (in view of the fact that it cannot be ended) of the extent to which its ways might be mended.

The domestic fire-grate, as it exists to-day, is a great (no pun intended) advance on the deep, open-bottomed structure that was a feature of the early Victorian era. This gave way in favour of the "register" type, fitted with a flap-door for the purpose of regulating the chimney draught, which, in its turn, was replaced by the slow-combustion pattern, closed-in below the fire-bars, as now generally fixed in all modern buildings. In connection with discussions on the subject, I have not observed any recognition of this improvement. But it cannot fail to exercise an important effect. Many speakers or writers seem to have overlooked it, and to have in view the old-fashioned and now practically obsolete Victorian grate. In this respect they resemble the electricians, who exhibit an extraordinary preference for a delapidated old flat-flame burner, when collecting data as to the illuminating value of gas, rather than a modern appliance that will do proper justice to the subject.

These considerations may possibly appear more suitable to the columns of a journal devoted to the interests of domestic or national economy, than to those specially concerned with the manufacture and distribution of town gas; but the gas industry occupies the remarkable position of a competitor and also of a supporter of the open fire. A necessary sequence to its primary operation is the production of a large quantity of solid smokeless fuel that is available for use to an important extent, in conjunction with coal, in the open grate; and the gas-fire has now been improved to such a degree that it can advantageously displace the coal-fire in certain circumstances. These matters are therefore well within the horizon of practicable gas politics.

No existing method or procedure can retain a prominent position in the public estimation in the absence of advantages or attractions of sufficient importance to commend it to the general use. The comforts afforded by the open domestic fire are far more widely appreciated, if seldom mentioned in speech or print, than the defects that are so stentoriously proclaimed from the lecture platform, or by means of scientific literature. It is sufficient to remark that the former have been successfully reproduced in modern gas-fires. Some defects attributable to the open form of grate—such as the escape and worse than loss of

certain valuable substances by way of the chimney, are inherent to the principle of construction, and as such cannot be cured; but the production of smoke and soot, and the excessive consumption of fuel, commonly spoken of as being unavoidable, are largely and unnecessarily exaggerated by the firmly established habit of negligent and incompetent usage.

Pending the introduction of the drastic, not to say next door to impossible, remedies that would appear to be all that the professors of science can suggest (and which are very much on a par with the actions of the Government in restricting the applications of coal tar at a time when the existing distilling plant throughout the country was not equal to the utilization of the large surplus thus thrown on the market—the natural result being an artificial slump in price and difficulties in securing clearance at that—of bringing about similar circumstances in regard to coke and sulphate of ammonia in the absence of evidence that the home demand would absorb the whole production, and in recommending nitre cake as a partial substitute for oil of vitriol in the sulphate of ammonia house) it may be worth while to divide the defects generally laid at the door of the open fire-grate into two classes—those that are incurable, and those that can be remedied to a greater or less extent by the intelligent application of such simple means as are feasible to, and within the reach of, every householder. One sometimes hears that a certain personage, at one time considered unmentionable in polite society, is "not so black as he is painted," and it is an easy matter to show that the open fire is called upon to answer, not only for its own sins, but also for those of the individuals who are supposed to look after it. Gas engineers have frequently found that the cheapness, ready adaptability, and long-suffering disposition of gas is an actual drawback to its use, as leading to a degree of recklessness and wastefulness that would not be possible, or would not be tolerated, in the case of a more expensive or less elastic medium. The same thing holds good with the open fire-grate.

The principal trouble of this class is brought about by the widely-established prejudice to the effect that a fuel in small pieces is of necessity inferior to the same material in large lumps, if not unscrupulously used as a means of adulterating the same. As a consequence, coal (and in a more limited degree gas coke) is for the most part supplied to the purchaser in blocks much too large for efficient use; and any action in the way of breaking to a fairly even and suitable size is more honoured in the breach than in the observance. In a general way, by far the greater part of the "breaking" is done in the fireplace, and after the fuel has been partly consumed; and the unnecessarily frequent and violent use of the implement known as a "poker" is an established institution. The poker was never intended for, and is not suitable for use as, a coal-breaking tool; its application to this purpose is an abuse and not a use. The proper place for the breaking process is the coal cellar, and not the fireplace. Anyone who can invent a cheap, simple, and effective machine for breaking coal into fairly even-sized pieces, about 1½-inch or 2-inch cube, and secure its general use—the latter condition being perhaps more difficult of accomplishment than the former—will do more towards the advancement of coal economy and smoke abatement than has been accomplished by all the talk of the last ten years. Gas companies as a rule supply broken coke for household use; but, in view of the prejudice against "smalls," which applies equally to coke, they are unable to carry the breakage to the extent that is best suited to the capacities of the drawing-room or dining-room fire. Anyone who has tried small coke, such as that which has passed a 1½-inch mesh, but over a ½-inch (and, as a consequence, only realizes about two-thirds the price of large, though quite equal in quality), in conjunction with coal, on an ordinary slow combustion open stove, will agree with this assertion.

Ordinary gas coke is subject to special defects, apart from the matter of size, that tell heavily against its use as a household fuel. It is water-quenched in the first place, and exposed to the weather, sometimes for a long period, in the second, and is usually delivered to the consumer in a soaked condition, so far as the exterior surface of the pieces is concerned. The actual percentage is not large enough to constitute an important consideration in connection with the selling price, as, unless purposely drenched, soaked in standing water, or recently exposed to unusually heavy rain, the water does not penetrate to any extent below the surface. It is more like a sheath on the outside. But, such as it is, the whole must be evaporated before ignition will commence. This objection is especially evident if it is used in admixture with coal, or put on the fire at the same time. The heat rendered latent by the drying process corresponds to that absorbed in the case of coal for the gasification of the volatile matter. We have observed that the fireplace is not the proper place for breaking fuel, and it certainly is not a suitable locality for drying it.

Coke must of necessity contain 40 or 50 per cent. more incombustible ash than the coal from which it was made; and if this coal was an inferior article, containing 10 per cent. or more of incombustible matter, all of which is passed on to the coke, one cannot expect to do an extensive household trade. The objection does not obtain with the average run of gas coke, properly applied, because the economy of fuel is sufficient to counterbalance the increase of ash—indeed, the average twelve-hour production may be less than when coal is used exclusively under customary conditions. Given a dry quenched and dry stored coke, in 1½-inch cubes, we should hear much less about the difficulty of using coke on the parlour fire, or of the need for a special brand of low temperature, and more readily igniting, material. It is evident that many who talk about the need for a fuel of this description, and the conditions incidental to the manufacture and supply of it, have had no practical experience in connection therewith. They have forgotten that the first half century of the gas industry—previous to the introduction of the fire-clay retort—afforded practical opportunity for a long practical trial of soft low-temperature coke; but no one seems to have recognized or appreciated its value. The writer was at one time associated with a gas-works where a low-temperature carbonizing process was in use for two or three years, and a coke of the quality attributed to "Coalite" was placed in the yard for sale side by side with ordinary gas coke. So far from realizing a higher price, customers were continually stating that they did not want any of "that soft patent stuff," and asking for the hard coke in preference. The soft coke depreciated by storing, even if stacked only 6 feet high, in the course of a few weeks, and quantities of it had to be disposed of in the works' boiler fire for this reason. In practice, the soft coke would almost need to be wrapped in cotton wool.

The managers of gas-works, who are far and away the largest consumers of gas coke, might with advantage give more attention to the proportion of ash in coal in their own interests, apart from those of the consumer or the outside trade—and this not only in connection with retort-house furnaces, but also in regard to its influence on carbonization and the production of gas.

All who are interested in the reduction of the smoke nuisance and fuel economy would do well to disregard air bubble schemes involving the aid of special legislation, or plans for next to impossible changes in established habits and customs, for a time, in favour of a few simple experiments that can be easily carried out in their own homes. Much of the benefit that has been already accomplished by the reduction of smoke from factory chimneys is the result of more careful usage of existing plants rather than its displacement in favour of some new scheme for combustion, such as charging the fuel in even layers or small quantities by some mechanical means. When bituminous fuel is used, the smoke from a fresh charge is caused to pass over a previous charge that has reached a more advanced stage of combustion.

One cannot expect to carry these improvements to so great an extent in the domestic fireplace; but this does not warrant the conclusion that there is no room for an advance on the usual practice of dumping-on half a scuttleful of coal or so two or three times a day, in pieces of all shapes and sizes, and of jabbing at the mass with the poker whenever so inclined, without regard to the need for such action so far as the process of combustion is concerned. At the present price of coal, apart from the national question, an economy worth consideration in these hard times can be secured by conducting the stoking of the fire, not necessarily on more scientific principles, but on plain common-sense lines. What would be thought of a furnace man who threw on coal in chunks of a size sufficient to nearly cover the whole area of the furnace bars, and in quantity equal to filling the entire fire space? But one often sees coal thrown on to the dining-room or drawing-room fire in lumps as big as one's head, or heaped halfway up the chimney, and the same broken up before they are warmed through; the result being volumes of black smoke for several minutes before the appearance of flame. Or lumps of all sorts and sizes thrown on higgledy-piggledy, leading to irregular combustion and short-circuiting of the draught; the current following the lines of least resistance. There is vivid incandescence in one part, and black unignited, but smouldering, coal in another part of the body of the fire.

If, in place of this procedure, a supply of coal is provided more evenly broken, and in pieces commensurate with the horizontal area of the grate on which they are to be used, also of gas coke similarly treated, and stoked with even and not too thick layers at more frequent intervals, exercising the same degree of care and periodical attention that is applied to other household duties, the poker will only be required for its legitimate purpose of clearing accumulations of ash at the lower part of the fire; and a marked improvement in the volume of visible smoke, the quantity of fuel used, and the even warming of the apartment, will result. The gas coke may be mixed with the coal or used alternately, according to circumstances; and it will be possible to secure a considerable part of the advantages that are, of course, readily obtainable by the use of soft low-temperature coke.

Natural Gas Supply in Hungary.—The Hungarian Upper House having discussed and passed the necessary Bill, the Hungarian Natural Gas Company has been formed by six Hungarian banks and the Hungarian Incandescent Gaslight Company on the one side and the German Bank and the German Petroleum Company on the other side. The Board of Management is to consist of 22 members, the Chairman of which is to be nominated by the Minister of Finance. The capital is to be 20 million kronen (about £833,000), of which 4 million kronen is to be allotted in payment for the cession of the natural gas fields, and the balance is to be subscribed in equal parts by the Hungarian and the German groups interested in the scheme.

THE EVOLUTION OF THE MODERN CHARGING AND DISCHARGING MACHINE.

By H. C. Widlake, M.J.Inst.C.E., of the Plymouth and Stonehouse Gaslight and Coke Company.

[*Concluded from p.* 581.]

Electrical Compensating Gear.

In the same manner as in the older type of single-motor machine a mechanical method of compensation had to be provided whereby power could be transmitted between the outer and inner frames of the machine at any vertical position of the latter, so in all types of machines have electrical compensating means to be employed in order to ensure continuous communication between the electrical apparatus—motors, controllers, and resistances—situated respectively on the inner and outer frames of the machine, irrespective of the vertical adjustment of the hanging frame. These conditions have been met by the employment of suspended flexible cables, guide-pulleys, and weighted pulley blocks to take up the slack. But in the later machines these arrangements are superseded by the use of vertical "banjo" wires strained up the sides of the outer frame, to or from which the electrical apparatus situated on the inner frame gives or collects its current in exactly the same way as the machine itself collects its motive power from the overhead trolley lines—namely, by the use of sliding or roller contacts pressing against these banjo wires. This arrangement combines the dual characteristics of neatness, simplicity, and reliability; while it provides a ready means of isolating the various circuits of the machine for testing in the event of a fault occurring. Small refinements of this nature cost but little extra, while they contribute largely to the maintenance of the machine in a thoroughly efficient condition.

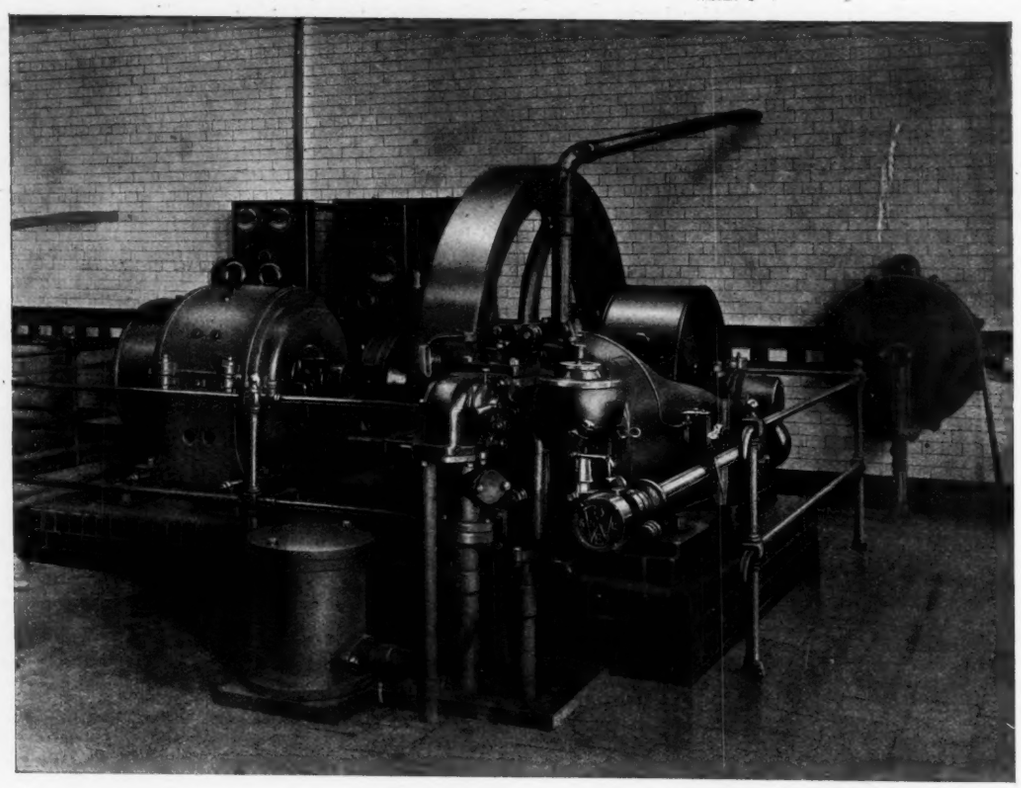


FIG. 8.—WESTINGHOUSE 52 B.H.P. GAS-ENGINE AND DIRECT-COUPLED GENERATOR AT THE SOUTHPORT GAS-WORKS.

Source of Electricity Supply.

While the purchase of electrical energy in bulk from an outside source offers a very convenient alternative to the installation of private generating plant, it must be remembered that it is scarcely desirable that so important a unit of the gas manufacturing plant should depend for its continuous operation upon an extraneous source of power, which experience proves cannot be considered as reliable as regards immunity from failure. The best insurance against the possibility of a dislocation of the even tenour of retort-house operations by the failure of the electrical supply is the installation of a private gas-driven generating plant in duplicate. A compromise between this and the purchase of power from an outside source is the use of a single generating set, supplemented by an emergency service from the supply authorities' cables. This compromise, however, is an expensive one, as electrical supply people do not look with much favour on such emergency supplies, and base their charges per annum for the accommodation upon the maximum kilowatts which, by the terms of their agreement, they have to hold themselves in readiness to supply at any moment. This annual charge has to be met, even though the emergency supply is never resorted to; any units used being charged for additional to the fixed annual charge.

A generating set working upon the load provided by an electrically operated retort charging and discharging machine is bound to be operating under a very poor load factor, and no effort should be spared to improve this load factor by extending the electric drive to other units of the plant to which it can be economically applied. As soon as the flexibility and convenience of the electrical system of power transmission and application become realized, new uses will be found for the plant; and by applying electric driving to (say) three or four coal and coke elevators or conveyors whose period of operation coincides with the use of the stoking machine, a good load factor will be provided for the generating set which will enable it to work at or near its maximum efficiency.

Before deciding upon the capacity of the set or sets he proposes to instal, the prospective user of electrical power in connection with a stoking-machine will be well advised to look around and make a fairly close estimate of the extent to which he can economically employ the new plant. The makers of electrically operated stoking machines and telphers are always ready to quote for the complete installation; but their interests, naturally enough, do not extend beyond the plant they are supplying. Therefore the engineer who is installing such a plant should see that the generating set is rated, not upon the basis of the demand provided by the stoking machine or telpher as the case may be, but upon the basis of those purposes to which, after a survey of his existing methods of driving, he may decide he can advantageously apply electrical operation. He will thus save himself the annoyance of finding himself saddled with a plant the rating of which renders it impossible for him to take full advantage of a system which his own progressive ideas have introduced into his works.

The capacity of generating plants on comparatively small undertakings ranges from 20 to 50 kilowatts; and a typical example of such an installation is shown in fig. 8, which depicts a direct-coupled 52 B.H.P. generating set, manufactured by the British Westinghouse Company, installed at the Southport Gas-Works. The writer has no information concerning the load under which this particular installation operates; but for the purposes of illustrating the approximate cost of generating electricity by means of

such a set, let it be assumed that the load is such as to maintain a 75 per cent. load factor on the engine, and, further, that the efficiency of the dynamo at this load is 90 per cent. The output of the engine at this load-factor will be $\frac{52 \times 75}{100} = 39$ B.H.P., or 29,094 watts; while the actual power available after conversion to electrical energy will be $\frac{29{,}094 \times 90}{100} = 26{,}184$ watts, or (say) 26 B.oT.U. per hour. At a 75 per cent. load factor the engine will take 10,640 B.Th.U. per B.H.P. hour, or 19 cubic feet of 560 B.Th.U. gas; and the consumption will therefore be $39 \times 19 = 741$ cubic feet per hour, or $\frac{741}{26}$ = (say) 29 cubic feet of gas per unit of electrity.

The following table shows the cost of power generation with this set per B.H.P. hour and per kilowatt hour (B.oT.U.) at varying prices of gas:

Rate per 1000 *Cubic Feet of Gas.*

	1·0	1·2	1·4	1·6	1·8	1·10	2·0
Cost per brake horse power hour . .	d. 0·228	d. 0·266	d. 0·304	d. 0·342	d. 0·380	d. 0·418	d. 0·456
Cost per kilowatt hour	0·348	0·406	0·464	0·522	0·580	0·638	0·696

This table is based on the varying costs for gas alone, and does not take into account the extra costs imposed by interest, depreciation, and lubrication charges, which in the case under consideration, and assuming a working period of 2800 hours per year at three-quarter engine load, would amount to about 0·15d. per B.H.P., or 0·22d. per unit generated.

Consumption of Current.

Although electrical operation of power-using machines provides a unique method of obtaining the most accurate records of the relationship existing between a given accomplished amount of work and the energy expended in the performance of the same, it is a regrettable fact that the average gas-works power plant is absolutely devoid of the simple appliances by which the data can be obtained. The result is that it is difficult to get hold of any really reliable data in this respect, while many engineers who employ electrically operated stoking machinery have not the remotest idea of the amount of coal or coke they can handle by the expenditure of a given amount of electricity.

Let us take the case of any of the various makes of stoking machines engaged upon the work of discharging the caked coke from retorts. Assuming equal conditions as regards the section and general condition of the retorts, amount and class of charge, it is obvious the same mechanical effort will have to be applied to discharge its contents in a given time, and any difference which may exist in the various machines in regard to the amount of electrical energy consumed in the operation of this task will depend upon the relative efficiency of their gearing. The installation at the Coxside works of the Plymouth and Stonehouse Gaslight and Coke Company with which the author is associated is served by two Fiddes-Aldridge simultaneous type machines—one a single-motor machine and the later one having a separate travelling motor in accordance with latest practice.

The following figures give the results of a test taken for the purpose of this publication with a view to determining the relationship between the bulk of material handled, the electricity consumed, and the time factors of the different motions. No mention is made of the raising-lowering motion, as in this installation this motion is used to such a small extent as to render its effect on the working costs negligible. The conditions were absolutely normal; no effort being made to speed-up the operations. The test was taken haphazard on a typical charging-discharging round of 35 minutes. The performance shown is not by any means out of the common. As a fact, the time per retort could have been improved upon had the operator been instructed to get over the ground as quickly as possible.

It will be observed that in the data immediately preceding the table the consumption of electrical energy is stated to have been 4 B.oT.U., or 0·097 unit for each retort charged and discharged; whereas in the table itself this figure is given as 3·362 units, or 0·082 unit per retort. The discrepancy is due to the fact that the first reading was taken by an integrating watt meter, and may therefore be regarded as correct; while the consumption shown in the table was estimated on the basis of observed average amperes, the time, and the average pressure. While the latter figures could have been adjusted to the watt hours, as shown on the watt meter, which was known to be correct, the author considers that such a procedure would rob the record of much of its value, as it is obvious that only by a very strange coincidence could the estimated wattage in a circuit where all the factors were constantly varying be calculated so closely as to check accurately against a watt meter record. The times of the different operations were taken by a stop-watch, while the average current was estimated by a series of visual observations on a test ammeter; and considering the varying nature of all the factors, it will be seen that the figures in the table, brought to a wattage basis and compared with the recorded kilowatts, are in themselves an excellent testimony to the care with which the test was carried out.

A further result of observation and experiment has shown that when the Fiddes-Aldridge machine is used for discharging alone the energy consumed per retort is about 0·075 B.oT.U., as against 0·097 B.oT.U. when the simultaneous operation is performed.

Type of machine	Simultaneous.
Number of motors	Two—Stoking and raising combined and travelling separate.
Number of retorts charged . .	41 16-inch by 22-inch by 20 feet. through.
Distance travelled by machine between first and last retort .	About 240 feet.
Time taken (total)	35 minutes.
Time taken (per retort) . . .	51 seconds.
Electricity consumed (total) . .	4 B.oT. U.
Electricity consumed (per retort)	0·097 B.oT.U.
Total coal carbonized	8 tons 6 cwt.
Average charge	8·1 cwt.

Table Showing Particulars of Operations.

Operation.	Time. Per Retort.	Time. Total.	Electrical Energy Consumed B.oT.U. Per Retort.	Electrical Energy Consumed B.oT.U. Total.	Average Observed Current.
	Seconds.	Min. Sec.			Amperes.
Discharging and charging simultaneously . . .	16	10 56	0·039	1·599	40
Withdrawing chain from retort . .	12	8 12	0·026	1·066	35
Travelling . . .	8	5 28	0·017	0·697	35
Total . . .	36	24 36	0·082	3·362	—

These figures are confirmed by an earlier test taken by the writer on the same machine and under the same conditions in September, 1914. In this case the test extended over a period of two weeks, during which time 2075 tons of coal were handled and 5188 charges of 8 cwt. (average) were placed in, and discharged from, a corresponding number of retorts. The wattmeter for recording the consumption of electrical energy was calibrated by its makers before the test, the results of which are as follows:

Duration of test	14 days.
Coal carbonized	2075 tons.
Number of retorts charged	5188
Average weight of charge	8 cwt.
Electricity consumed (total)	482 B.oT.U.
Electricity consumed (per retort)	0·093 ,,
Electricity consumed (per ton of coal carbonized) . .	0·23 ,,
Tons of coal handled per B.T.U.	4·35 tons.

Conclusions.

In view of the assistance afforded him by the makers of the different machines dealt with in this publication, the author much regrets that the only tests he has by him are those referring to the machines on the plant of which he happens to be in charge. Data of this sort are, unfortunately, difficult to obtain; and it is suggested that gas engineers who use electricity for the various operations in their works would be doing a great service by inserting wattmeters in their circuits and equating the amount of electrical energy consumed over a given time with the amount of coal and coke handled. The use of such instruments should not be regarded as a luxury but rather as an absolute necessity to the engineer who desires to get all he can out of his plant. By such means alone can he keep his finger on the pulse of the various units and detect incipient defects not only in the motor but even to a greater extent in machines to which the motor is coupled.

Whether it be stoking machinery, elevators, conveyors, or telphers, it will be found that a certain ratio exists between the amount of current consumed over a given time and the amount of material handled in that time; and so long as the machine remains in good condition, the ratio will keep the same. When wear or misalignment takes place in (say) an elevator or conveyor, the ratio will alter; and the observant engineer will see that it requires more electricity to handle a ton of coal, and will at once look for the cause. In short, these instruments afford an invaluable check upon the mechanical condition of every machine driven by an electric motor, and the cost of installation will be soon wiped out by the lower maintenance charges in respect to such machines. Any diminution in the efficiency of a machine so driven can be at once detected, and the "stitch in time" applied before the trouble shows itself by an actual stoppage.

While the use of electrical plant on gas undertakings is steadily increasing, engineers as a whole are slow to avail themselves of the facilities which the electrical drive affords for the easy and accurate measurement of power, and are too prone to look upon the integrating wattmeter and the recording ammeter as expensive luxuries. A striking example of the extent to which a well-known Continental gas engineer takes advantage of such characteristics was afforded in an article on the South Gas-Works, Amsterdam, by Mr. J. Van Rossum du Chattel, the Chief Engineer of these works, which appeared in the "Journal" for Jan. 5, 1915. Mr. Rossum du Chattel showed that no less than 69 motors, aggregating 716·6 H.P., were employed for a wide range of purposes on his works, while the current for all the operations was metered; the consumption for one year being given as 565,624 K.V.A. hours (the supply is an alternating one).

In placing this article before the readers of the "Journal," the author desires to express his thanks to the British Thomson Houston Company, of Rugby, for permission to use the particulars published of the crane motor supplied by that firm for the

operation of stoking machinery. He also desires to make it clear that he holds no brief for any particular type of machine, and has dealt with machines made by firms whose names are household words in the gas industry.

In conclusion, he desires to express his thanks to Mr. P. S. Hoyte, the Chief Engineer of the Plymouth and Stonehouse Gaslight and Coke Company, whose courteous permission has enabled him to publish particulars and tests concerning the stoking installation at the Coxside works of the Company.

BRITISH COMMERCIAL GAS ASSOCIATION.

Report of the Executive.

A Meeting of the General Committee of the British Commercial Gas Association was held last Tuesday week, when the Executive submitted a report of which the following are some items.

PUBLICITY CAMPAIGN FOR 1916.

The steady inflow of subscriptions has enabled the Executive to proceed with all arrangements for the spring and summer publicity campaigns. They have taken advantage of the publication of the report of the Home Office Committee on Factory and Workshop Lighting to call attention in the Technical and General Press to the fact that all the recommendations of the report can be easily fulfilled by the employment of modern incandescent gas lighting.

The campaign will also deal with water-heating appliances and cookers. The makers have reported that they will, unless unforeseen contingencies arise, be in a position to meet a normal demand for water-heaters.

THE GAS INDUSTRY AND WAR CONDITIONS.

The Executive have endeavoured to be as vigilant and active as possible in guarding the industry from avoidable injury arising out of war conditions, while always regarding the interests of the nation as a whole as absolutely paramount. The following are the points upon which action has been most necessary and has been taken in conjunction with the Institution of Gas Engineers and the Society of British Gas Industries.

(1) In regard to the questions of the greater possible usage of gas and of financial facilities, a deputation representing the three bodies at the end of October had an interview with Sir Sothern Holland and other officials of the High Explosives Branch of the Ministry of Munitions. This resulted in a strong letter being addressed by the Minister of Munitions to all Government Departments, emphasizing the national importance of gas being used wherever possible; and in our being asked to furnish the Ministry with particulars of all specific cases of threatened displacement (or ignoring) of gas, or of financial stringency hindering the development of gas manufacture.

The Secretary obtained particulars of numerous cases under both headings, and had frequent interviews with officials of the Ministry, with the result that steps were taken by them, not without success, to press upon other departments the claims of the industry to consideration, and to induce the financial authorities to modify their attitude on the question of additional capital required. The Secretary also had interviews with officials of the Board of Trade and the Local Government Board on the same subjects. Letters from the Association to the Secretary of State for War, the First Lord of the Admiralty, the Postmaster-General, and the Commissioners of Works, putting the case for gas before them on behalf of subscribing undertakings, brought sympathetic replies, and it is believed have had considerable effect.

The Chairman also, on behalf of the Association, had an interview with the Director of Factory Construction, with the result that a memorandum explaining why gas should be used, and how it could be used, in munitions factories was sent out by the Director to every such factory in the country. The Director also took prompt action in cases subsequently brought to his notice by the Association of proposals to ignore gas where it could be employed with marked advantage. Correspondence between the managers of factories and the Director, and reports received from gas managers, have shown that the action taken had good effect.

Everything possible has been done to bring to the knowledge of the public the fact that, by the continued and increased use of gas, consumers were assisting in the production of munitions of war.

(2) In regard to the naphthalene difficulty, it was decided, after careful consideration, that, as this was a local trouble, experienced in some districts and not in others, it would be better for it to be dealt with locally. A circular putting the facts before consumers was therefore prepared for the use of members; and large quantities were ordered and distributed in the affected districts.

(3) In regard to the labour difficulty, steps have recently been taken to impress upon the authorities what the result would be upon the output of explosives, and upon the labour problem in the home and in industry, if the maintenance of existing, and the supply of additional, gas appliances were seriously restricted by the wholesale withdrawal of labour from the outdoor departments of the gas industry and the stove-makers' works. The Explosives Department have promised to make strong representations on the subject to the Labour Priority Committee, and, if necessary, to arrange for evidence to be heard by that Committee.

(4) On the question of sulphate of ammonia, the Executive, in support of, and after consultation with, the Sulphate of Ammonia Association, have addressed a letter to the Board of Agriculture, protesting against the prohibition, or an undue limitation, of the export of sulphate.

On the question of sulphuric acid, their information is that the Ministry of Munitions and the Board of Agriculture are doing all they possibly can to assure adequate supplies, but that the military requirements are so enormous, and still increasing, that the production cannot keep pace with the demand. The Sulphate of Ammonia Association hope shortly to issue a memorandum on the subject of the suggestion made by the Ministry of Munitions, that gas-works should use nitre cake in small quantities as a substitute for sulphuric acid. The question will be kept under close observation; and if any useful purpose can be served by action in support of the Sulphate of Ammonia Association, it will immediately be taken.

(5) In regard to coal prices, the Executive are prepared to take action in support of the existing Coal Committee immediately there is any definite ground for believing that any proposal to sanction a further advance in coal prices is under serious consideration by the Government.

ASSISTANCE RENDERED.

In addition to the assistance rendered to the industry as a whole outlined in the foregoing, the Association continues constantly to afford assistance to the members and their undertakings individually.

Another branch of the service to the industry which is being rendered without any outward sign of its operation, but is of particular and far-reaching value, is that concerned with the correction of what is wrong in, and the supply of what is missing from, the information respecting gas in text-books, handbooks, and works of reference, both popular and scientific.

INDUSTRIAL FUEL COMMITTEE.

The following members have been constituted a Standing Committee on Industrial Fuel: Messrs. Broadberry, Clarry, Goodenough, George Helps, Hilton, Roxburgh, Thornton, Walter, R. Watson, and Yates. The extract given below from the minutes of the Committee will explain what work is in hand. It will be readily understood that nothing more than preliminary work can be done under the present abnormal conditions.

> It was resolved that information respecting typical installations of industrial fuel appliances be collected, and carefully classified according to the various sections and trades, so that a general index might be prepared which could be published and distributed for the use of members. The opinion was expressed that such a record would undoubtedly prove of material advantage in subsequently developing the more general adoption of gaseous fuel for industrial and business purposes.
>
> It was felt, however, that until the war was over no very strenuous action in this matter could be undertaken; but the Secretary was instructed to proceed with the preparation of a complete list of all trades, and the collection of available information—the members promising hearty co-operation and assistance.

COAL TAR AND HIGH EXPLOSIVES.

The first of two lectures on "Explosives and Drugs Made from Coal Tar Products," by Professor H. E. ARMSTRONG, F.R.S., was delivered at the Royal Institution last Thursday afternoon, when, in addition to hearing many facts of peculiar relevancy at the present time, the audience witnessed a great number of practical demonstrations.

Beginning with the days of saltpetre and charcoal, progress was traced through the making of gun cotton from cotton, nitric acid, and sulphuric acid, down to the most modern high explosives, derived from coal tar—that is, from carbolic acid and toluene. The manufacture of gun cotton and nitroglycerine was practically illustrated, as well as the making of the later explosives. In the case of toluene, the lecturer explained, it is necessary to convert the substance into trinitrotoluene—an operation which involves three stages. First of all, it is converted into the mono-nitro compound; then into dinitrotoluene; and finally into trinitrotoluene, by the action of a concentrated mixture of nitric and sulphuric acid. In the second stage, instead of a liquid substance there is a solid one produced; and a sample of this was melted down to show the third stage. A considerable amount of heat is produced in the first stage; in the second stage, very little; while in the third, it is necessary to add some heat in order to bring about the change. The resultant product is, of course, much more powerful than nitro glycerine or gun cotton. It is extraordinarily sharp and quick in action, and very local.

In the course of his lecture, Professor Armstrong brought forward convincing evidence to show the close connection that has all along existed between the Royal Institution and explosives; this really forming part of the history of the subject. Nitroglycerine was invented in 1847, but not experimented with on a large scale until about 1860, when Nobel took it up, and it began to come into use as a blasting agent. Later on Nobel introduced blasting gelatine. Then came cordite (sticks of which were shown, and fired by the lecturer, with no other result than a flare). Attention was drawn to the important work that has been performed by Sir Frederick Abel and other prominent investigators in connection with the subject.

The Massillon (Ohio) Electric and Gas Company have always experienced some trouble from water and quicksand whenever an excavation is made at their plant side. The latest trouble was encountered when the Company's workmen began to excavate for the foundations and condenser pit of a new 6000-kilovolt-ampère turbo-generator. In order to remove the water, a sump in the excavation was connected by a 4-inch pipe line with the Le Blanc condenser of a 2000-kilowatt machine already operating in the station. The condenser took its cooling water from the pit through this pipe instead of from a canal. As the pit was excavated the pipe line was lowered by adjusting a double-L connection placed in the line for the purpose. This scheme, besides providing an inexpensive means of lifting the water, possessed a further advantage in that it provided the condenser with cold circulating water.

SOUTHERN DISTRICT ASSOCIATION OF GAS ENGINEERS & MANAGERS.

The Annual Meeting of the Association was held last Thursday, at the Hotel Cecil, Strand, W.C. There was a large attendance of members. At the commencement of the proceedings, the RETIRING PRESIDENT (Mr. J. W. Auchterlonie, of Cambridge) was in the chair.

MINUTES CONFIRMED.

The PRESIDENT pointed out that the minutes were taken as printed in the "JOURNAL OF GAS LIGHTING;" and he would ask the members to confirm them.

Mr. SAMUEL GLOVER (St. Helens) moved the confirmation of the minutes.

Mr. B. R. GREEN having seconded the motion, it was unanimously carried.

REPORT AND ACCOUNTS—INSTITUTION BENEVOLENT FUND.

The report in the main was a review of the proceedings of the year. From its concluding passages, it is gathered that during the year twelve new members have been elected, and five have resigned. As to the accounts, the total amount of the subscriptions received in respect of the year was £98 14s.; and the total expenditure was £96 6s. 6d. This expenditure was somewhat larger than usual, as the cost of the tea at the March meeting and the expenses of the special meeting at Caxton Hall were borne by the Association. There has also been considerable correspondence in connection with the education of gas-fitters.

The PRESIDENT said he had pleasure in proposing the adoption of the report. It would be noticed that the income of the year had only been slightly greater than the expenditure—some £2 or £3. The reason possibly for the higher expenditure was the amount of printing matter and postage that had been necessitated, especially in connection with the gas-fitting classes. This matter, of course, was in working order now; and the expenditure might reasonably be expected to be less in future. They had also had one more meeting than was the case normally. Meetings, naturally, cost something; and incidentally they meant, with some 200 members, much extra work for the Hon. Secretary. There was one other matter he should put before the members. The Benevolent Fund of the Institution of Gas Engineers was deficient to the extent, he believed, of from £30 to £40. He appealed to the members in greater number to support the fund. A good work was being done by it; and he agreed with the suggestion that had been made that sample instances of the work—not giving names, but designating the cases by "A," "B," "C," &c.—should be circulated, to show to members of the industry something as to the character of what was being done through the fund. In connection with the deficiency, the Committee recommended that a grant of 10 guineas should be made. The Manchester Institution and the North of England Association had each voted 10 guineas to help the fund; and he thought it was up to the Southern Association to subscribe an equal sum to help to meet the deficit.

Mr. J. DONALDSON (Tonbridge) seconded the motion for the adoption of the report; and it was unanimously carried.

Proposed by Mr. D. T. LIVESEY (East Grinstead), seconded by Mr. A. CADDICK (Croydon), a sum of 10 guineas was voted to the Benevolent Fund of the Institution.

ELECTION OF NEW MEMBERS.

The HON. SECRETARY (Mr. H. C. Head, of Winchester) read, in the following order, the nominations for membership: Mr. John A. Gray, of Teignmouth; Mr. W. H. Hammond, of Eastbourne; Mr. Thomas Curr, Bankside Gas-Works of the South Metropolitan Gas Company; Mr. Charles G. Dawson, of Paignton; Mr. Edwin Dunbar, of Southampton; Mr. R. G. Luxon, of Launceston; Mr. F. A. West, of Sittingbourne; Mr. W. Thomson, of Ramsgate; and Mr. C. H. Rutter, of Brighton.

Moved by Mr. A. CADDICK, and seconded by Mr. S. GLOVER, these gentlemen were unanimously elected to membership.

THE RETIRING AND NEW PRESIDENTS.

The PRESIDENT remarked that this completed the duties of his year of office, except one, and that was to induct his successor. Mr. Doig Gibb was known to every gas engineer in the Southern District, and he ventured to say to all throughout the United Kingdom. It would be idle therefore for him (Mr. Auchterlonie) to dwell on the many virtues and abilities of Mr. Doig Gibb. He had already received the highest honour that the gas profession had in its power to confer—that was, the presidency of the Institution of Gas Engineers. They all knew how well he then fulfilled the duties of the office; and he (Mr. Auchterlonie) thought he was only voicing the opinion of the members of the Association when he said that they took it as an honour to have Mr. Doig Gibb as their President. He wished him a successful year of office, and that he might see the war terminated, and the country back to as near as possible normal times, before he handed over the office to his successor.

Mr. W. DOIG GIBB then took the chair, and was heartily greeted by the members.

The PRESIDENT said his first duty, on taking the chair, was to move that a cordial vote of thanks should be given to his predecessor, Mr. Auchterlonie. The members knew that, in spite of the strenuous year they had passed through, Mr. Auchterlonie had been untiring in his efforts to keep the Association moving in the best possible path; and that, at considerable inconvenience to himself, he had maintained the highest traditions of the office in a style worthy of anyone who had ever before occupied the post. Although he (the President) unfortunately was prevented from being there, he understood the members had an exceedingly pleasant and profitable day on their excursion visit to Cambridge. From this visit they knew that Mr. Auchterlonie not only shone in the presidential chair, but in the administration of a gas undertaking as well. He (the President) was sure that the members would be quite unanimous in according him their heartiest thanks for the way he had presided over the destinies of the Association during the year just closed.

Mr. SAMUEL GLOVER, in seconding, said the able way in which Mr. Auchterlonie had conducted the business of the Association, and had presided over them, had endeared him more deeply than ever before, if this were possible, in all their hearts. Cambridge had been (so to speak) an ever-open door to pilgrims who wanted to see a model gas-works managed in a model way. He was pleased to see that Mr. Auchterlonie was looking no worse for his strenuous year. He had again proved, as all of the younger members might prove some day or other, that the occupying of the presidential office had the effect of making an engineer a better engineer, and a man a better man. They knew Mr. Auchterlonie better through him having been their President; and they desired to express their hearty thanks for his services.

Mr. AUCHTERLONIE said he thanked Mr. Doig Gibb and Mr. Glover for their too flattering remarks. To him his year of office had been a great pleasure; and the Hon. Secretary and his colleagues on the Committee had made the work extremely easy.

REPRESENTATIVE ON THE INSTITUTION COUNCIL.

Mr. W. N. WESTLAKE (Exeter) moved, and Mr. B. R. GREEN (Mitcham) seconded, that the President be the representative of the Association on the Council of the Institution during the ensuing year.

The motion having been adopted,

The PRESIDENT, in his acknowledgment, said he need not say more than confess that this was very genial employment. He liked to be on the Council of the Institution, because by being there he got to learn more as to what was going on.

PRESIDENT'S ADDRESS.

Gentlemen,—I have thanked you once already for the honour which you have conferred upon me by electing me President of your Association; but I thank you again now—both because my feelings prompt me to do so, and because otherwise the preface to the remarks I am about to make would be incomplete.

I would that it could have been my happy lot, on taking the presidential chair, to be able to congratulate you on the termination of this terrible war. Alas, the end is not yet; and we have no alternative but to fight on until our aspirations, and our firm intentions, have become accomplished facts. We can all fight, and I hope that we are all fighting, in some way or another, for our country, and for all that makes life to us worth living—for freedom, for justice, for humanity, indeed for civilization itself. That we are fighting for all these things, Germany has herself incontestably proved by the line of conduct—or rather, misconduct—pursued by her in the portions of Belgium and France that have been overrun by her armies. Just for one moment contrast the brutalities (of which there is ample proof) perpetrated by the Germans upon women, children, and unarmed men in the sorely-tried countries that I have named, with the long, expensive, disinterested, and successful efforts put forth by Great Britain to abolish the slave traffic, with all its horrors. Never has Germany, or any one of the German States that preceded the birth of the present monster, done anything except to gain her own material ends; never moved, except to further her own selfish aims.

In saying we can all fight, I am, of course, using the word in its broadest sense. In our own case, we can strike a very effective blow for the country by exerting ourselves to the utmost to produce the necessary chemicals for explosives, in munition work, and sparing every possible man who is able and willing to join the Colours. With quiet petermination, we must keep things going, and see the matter through. We must keep calm and cheerful, and, in short, "make the best of a bad job." We shall be strengthened in the determination which we all feel to be unceasing in our efforts to help on the good cause, if we bear always in mind that the "bad job" was not of our making, and that the complete success of the Allies against a strong and ruthless foe will secure a happy future for our descendants, if not for ourselves.

When I came to think over what I should talk about in my address—always a difficult matter for a president to decide, and a problem which tends to become even harder to solve as time goes on—I found myself faced at the very outset with a difficulty. Occupying the position of a "free lance," through not being connected with any particular gas undertaking in the ordinary way, it is possible for me to avoid giving you a description of special

plant erected, or work that has been done. But the result of this is to still further restrict the field that is open to me to touch upon—a field already much limited through the exhaustive and able manner in which the past twelve months' history of gas business has been dealt with by the "JOURNAL OF GAS LIGHTING" in its review of the year 1915.

The present position and happenings, to a large extent, dominate the thoughts of us all; and there is little which I can usefully say in addition to what has been published. But I would like to pay a well-deserved compliment to our Technical Press; for, well served as we always have been, the present crisis seems to have found our editors and their staffs anxious and willing to do their "bit." When I have asked relatives, who are temporarily residing in different parts of Europe, how the war is getting on, I get the same answer: "They are doing their bit; and if everyone else does the same, we shall win through." The future, as regards the war itself, must not for a moment be allowed to be in doubt; but as for the many other things in the future, who can tell? I have selected a few of the problems, present and future; and some general remarks on these will not come amiss.

TOLUOL AND BENZOL.

In view of my statement as to the importance of exerting ourselves to the utmost to produce the necessary chemicals for the manufacture of explosives, you will no doubt be expecting me to say something about benzol and toluol. It will be known to all of you that, when the war started, the urgent call was for "toluol." Later on, the situation changed, and the call was for "toluol and benzol;" and now the call is for "benzol and toluol." At the commencement of the war, the immediate greater production of toluol was of vast importance. It was known to be in the gas; but new plant and securing suitable oils or chemicals from outside sources would have meant serious delay. There is no doubt the very valuable suggestion of Mr. Charles Carpenter, which has enabled the industry to almost immediately increase the output of toluol in such a simple manner, has been of the greatest possible utility to the country. His process required practically no new plant, and employed, as a washing medium, a product of the gas-works themselves. The process was generally adopted; and the great majority of the gas-works throughout the country are working it with more or less successful results—the results varying, not because of the process itself, but with the different sizes and designs of the plants which it was found possible to allot to this particular purpose.

With the approach of summer, any possible scheme having for its object the keeping-down of the temperatures of the gas and tar should be at once put in hand. In many works, the tar supply could be cooled by leading the supply-pipe through any existing cold-water storage tank. In one works, an excellent result has been obtained by putting the supply-pipe down into, and up from, a sunk well. At Bournemouth, as one small part of Mr. Moon's cleverly designed and ingenious oil-washing plant, the hot-oil pipe has been led through the pump flow from a well.

If the tar used be too thick, or if a little more can be afforded from the gas, a small addition of oil to the washing tar will help the working and increase the desired contents in the finished tar. The great point about tar washing is to use the tar as free as it is possible to get it from water, to employ it in comparatively large quantities, to keep the gas and the tar at a temperature not exceeding 60° Fahr., and, above all, to secure as intimate a contact between them as may be allowable, when back-pressure and other considerations are taken into account.

BENZOL AND TOLUOL.

The situation has, however, now undergone a change; and the growth in the demand for benzol is such as to render it highly desirable that administrators of gas-works should consider whether they cannot go beyond the stage of tar washing and wash with oil, in order to get better results, especially in benzol. The suggestion I am making is, of course, not a new one to some of you; but the matter should be considered by all those whose operations are on a sufficient scale to justify them entertaining the idea. There are already many instances throughout the country where engineers, on their own initiative, have constructed more or less makeshift oil plants from old material at their disposal; and there is eloquent testimony to the ingenuity and determination of these gentlemen in the fact that a number of these home-made plants are working satisfactorily and giving excellent results.

A Presidential Address at the present time is not a suitable medium for conveying much detailed information about either tar or oil washing; but the necessary information can easily be acquired by those who wish for it, either by application to the Superintending Engineer of your district (Mr. H. O. Carr) or to any of his assistants, or to the Department of Explosives Supplies, with which I am temporarily connected.

TAR DEHYDRATING PLANTS.

The installation of tar dehydrating plants is being recommended for many works as, once erected, these plants will always be useful, even after a return to normal times. If not employed in handling tar, they can be used for the debenzolizing of treated oil. Though a cheap substitute, in small works, for a proper steam-heated oil-distilling plant—especially if this latter would have to be ordered complete from an outside plant manufacturer—they are not so efficient, if thorough oil washing is carried out, and present some elements of danger in being direct-fired. But we are at war, and much useful service can be rendered by their intelligent use.

NAPHTHALENE TROUBLES.

A discussion on tar and oil-washing naturally introduces some remarks on naphthalene troubles. With the severe fall in temperature that was experienced last November, some of the undertakings which were carrying on efficient tar washing were troubled with a great increase in the number of naphthalene stoppages. Curiously enough, however, this unpleasant experience was only felt in certain areas; other parts seeming not to be affected at all, though the temperatures were to a great extent similar. Cumulative evidence goes to show that these troubles were probably due to the tar-washed gas (of lower vapour tension) picking-up naphthalene which was already in the mains, and depositing it again in the smaller, and presumably cooler, service-pipes. Speaking generally, the direct effect of the tar and oil washing processes is to decrease the naphthalene contents in the finished gas, and not to increase them.

Of suggested remedies for the trouble, there are no end. Leaving out vertical retorts (which are an expensive remedy, if only for the purpose under discussion) and working at lower heats (which would help towards the greater production of benzol and toluol, if not of "gas made per ton"), these may be classed as carburettors or sprays.

The lighter spirits cannot be at present used; and the carburettors are therefore generally worked by steam heat acting on paraffin oil (such as is used in lamps), over which the whole volume of the gas, or part of it, is passed. The use of 15 to 20 gallons of this oil per million cubic feet of gas seems to be sufficient in nearly all cases, if it be used in time, and its use continued. There is no need for anyone to wait for the present uncertain delivery of suitable plant, for the construction is of the simplest, and the working is efficient as long as the oil is taken up and not deposited in the syphons. I have come across several home-made plants, heated by gas-jets or steam, which are doing their work quite well.

Sprays are also being used for the purpose. The great point is to have a spray which will atomize the oil, and force it into the gas in a very fine mist. The mist is formed by three methods—blowing in by air pressure, blowing in by gas pressure, and blowing in by oil pressure.

I cannot agree that blowing in by air pressure is desirable. The introduction of air into the gas is a retrograde step. No doubt, the quantity is very small, and is probably more than made up (in most ways) by the oil introduced at the same time. But its use is unnecessary, when a small gas compressor will allow gas to be used as the atomizing medium. If air pressure be available, and it is not convenient or economical to specially compress gas for the purpose, it is easy to cap both ends of a suitable sized straight length of pipe, put this on end, use it as an oil reservoir with air pressure on the top, and atomize the oil by itself through a suitable nozzle. A very short time, once in (say) 24 hours, suffices to turn the air pressure off and fill up the reservoir with oil.

By any of the three methods, the gas will permanently take up a considerable quantity of oil, and no deposition will be found in the syphons. If precaution against over-running be required, an oil lead back from a syphon at no great distance from the nozzle is easily arranged. It has been found that the oil either settles out very quickly or (practically) not at all. The great point seems to be to blow the oil mist along a straight line of pipe of as large diameter as possible, and not allow it to impinge on any surface more or less at right angles to its initiatory line of travel.

Above all—and this not only applies to naphthalene troubles indirectly due to tar and oil washing, but generally—do not come too hastily to conclusions. I have in mind my own experience in days before this war was thought possible. It was the usual start—increasing complaints and "something had to be done." A carburettor was put up, and got to work. More, and still more, complaints came in; and it might have been said then that the whole thing was a failure. But close touch with the question (in days when workmen were more easily obtained) revealed the fact that, month after month, the leading main was being completely cleared of all traces of naphthalene at greater and still greater distances from the works. What was taking place was evident. The gas was picking-up naphthalene, and carrying it forward for a certain distance, and then depositing it where it was a greater nuisance than ever. Perseverance was the only way to "make good;" and, after doing so, it was comparatively simple to keep there—varying the strength of the remedy according to the changing conditions.

THE TAR QUESTION.

The differences of opinion between tar distillers and gas undertakings are not a product of the war, though this has undoubtedly accentuated them. The present position includes the claim of the gas undertakings that their tar is now of greater value, and that no adequate extra allowance (in many cases) is made for this, and also that such removals of tar as will relieve them from congestion are not carried out. On the other hand, the tar distillers are hampered with large stocks of pitch and creosote oil, and are not in a position to do as they might have done in pre-war times. But, with all the statements and facts known to everyone, there is a general feeling that the gas undertakings are not being treated with the fairness which might be expected, when consideration is given to what they are doing for the country, and that the question between the two parties is essentially a national one. I know that there are many side-issues; and I will certainly not be drawn into any correspondence about them, for this might

last out the war, or until the powers that be intimate that "This discussion is now closed."

Leaving the war out of account, the tar distillers, after all, are working their own business for their own ends; and it is up-against the gas undertakings to do the same in future. If they are under the impression that they are not being justly treated, the remedy appears to be in their own hands, and it ought to be easy to create such a condition of affairs as will ensure the best results for the industry. And let me say, in common fairness, that some of the complaints of the gas undertakings are one-sided. What of the engineer who complains that his quoted price from the tar distillers is governed by his distance from any competitive works, while he cheerfully puts up his price for treated tar to the road authorities on exactly the same basis.

It is satisfactory to learn that the Treasury have given the Road Board powers to spend a considerable sum on the roads; for this will mean the utilization of a certain amount of tar, and also more comfort to road users.

PITCH.

The accumulation of creosote oil is one of the effects of "war" business, when tank-waggons and ships are suddenly called upon to do infinitely more work. This must be made the best of; for we must remember in all I have said, and in all I am going to say, that "we are at war."

Pitch is in a different position; the war has closed the principal markets. But pitch stocks are, in one way, more easily handled than creosote oil; for pitch can be stocked in the open, and does not need expensive storage tanks. No doubt, it means storing unremunerative money as well, and extra costs in handling. Pitch is best stored in the open; for, like a recent writer, I have seen it placed in an old coal-store (next to a retort-house), and it is rapidly trying to prove that it should have been stored in a more suitable place to meet its natural desire to "keep moving." Any practical suggestion for the utilization of pitch will have general attention paid to it at the present time. Many workers are in the field.

The carbonization of pitch in gas-works or coke-ovens is being investigated by various persons; and some definite rules may soon be the outcome. As regards gas-works practice, it would appear that a 5 per cent. mixture of pitch is the safe limit. It does not materially improve the results secured from the coal alone; but it is claimed that its use improves the coke. This is what might be expected, when a hard pitch is used. With a softer pitch, the results should be better. The pitch should be broken-down as finely as possible, and thoroughly mixed with the coal. This necessary procedure can be understood. Larger pieces would "run;" but smaller pieces, when melted, would be more easily absorbed and held in position by the adjacent small coal. Most trouble has been found by the mixed material "clogging" on to internal chargers; but such methods as De Brouwer charging and shovel charging are not subjected to this. In normal times, and with pitch at normal prices, its use might not be justified; but at present prices, and because of the far-reaching effects of a reduced pitch stock, it is certainly necessary for every one of us to give the question his serious consideration.

A firm of tar distillers has informed me that they are successfully burning pitch under their boilers. In answer to further inquiries, I am informed that there is a percentage mixture of heavy oils with it. I have been invited to see the process, but have not yet been able to do so. I venture to suggest the possibilities of fitting furnaces with an interior pitch-melting plant. The furnace could be started with sprayed creosote oil, until the necessary heat was obtained; and then a spray of melted pitch and creosote, in proportions to be determined, could be sprayed by compressed air from a suitable nozzle. In closing-down, the pitch could be shut off before the temperature fell.

THE CALORIFIC STANDARD.

All the signs point to the fact that the gas of the future will be judged on a calorific basis; and present opinion points to a standard of 500 B.Th.U. gross. It is obvious that the recently-imposed neutral zone of 500 to 540 B.Th.U., with penalties at 500 B.Th.U. is absurd; since the published tests show that the 500 B.Th.U. penalty limit is the only one which is seriously taken into account.

The 500 B.Th.U. standard allows reasonable facilities to the flat-flame burner users. For years they have had consideration beyond their merits. In the majority of instances, incandescent burners would give better and cheaper service; and in these cases there has been a long course of education available, but unapplied. I grant that in some instances flat-flame burners are necessary; but in nearly all these cases they are in workshops, and in groups, and are not isolated burners. It should be easy to fit local carburettors to meet such peculiar conditions. When one comes across the statement of a large company that 99 per cent. of their gas is used for its heating value, it is difficult to understand why such consideration should be given to the 1 per cent. Surely, it should be as easy to instal a carburettor as it is to lay down a compressor; and economy for the majority should be better business than pandering to the minority.

When dealing with the "gas of the future"—which, as I have said, I anticipate will be of a calorific value of 500 B.Th.U.—it will be essential for great care to be paid to the purification and composition of the gas. It ought not to pay to carry inert gases through an expensive distribution system and use some portion of "live" gas in heating them up for no useful purpose.

MAKE ALL NEEDFUL SACRIFICES.

Coming back from the future to the present time, I should not like it to be assumed, from the remarks in the earlier part of this address, that, because the demand for benzol has grown to such proportions, the demand for toluol has ceased. That is not by any means the case; and it is up-against everyone during the trying ordeal through which the country is passing to do all he can in the way of producing both benzol and toluol. It is hardly necessary for me to point out to you how much greater is the extent of the good work that can be accomplished if there is hearty co-operation between an engineer and his directors. It is surprising to find the great variations there are in the opinions of those connected with different undertakings as to what they can and what they cannot do; and one cannot help feeling that some part of this difference would disappear if the needs of the case were as fully realized in some cases as in others. While the interests of the shareholders and of the consumers must, of course, receive due consideration, the immediate question we have to ask ourselves, and to answer, is: "What efforts and what sacrifices can we make, in order to help to bring the war to a successful termination?"

Let me not be misunderstood. The gas industry has come nobly to the assistance of the country; and it is the very fact that it has come forward so readily which emboldens me to urge upon all to try and do still more.

THE REWARD.

This patriotic work will not go without its reward. Indeed, I am strongly of opinion that the sacrifices which the gas undertakings are making at the present time will result, in the future, in great benefit to them. With all this good work to their credit, the gas undertakings must be better recognized and more generously treated by the Government than they have been in the past; while even the experiences gained by the alterations in candle power, &c., which to a more or less extent have resulted from oil and tar washing, will have their advantage in serving to convince Parliamentary Committees of the advisability of granting standards which will enable consumers to be efficiently supplied with gas on the most economical basis possible. One thing certain is, that if the country is to have a future at all, every trade will have to look more carefully than hitherto into the questions of economy with regard to methods of production.

CHEMICAL MANUFACTURERS AND RESIDUAL CLAUSES.

There is another direction, too, in which the war should tend to enlighten Parliament. I think it will show them that they have done wrong in departing from the decision of the Joint Committee of the two Houses who came to the conclusion that gas-works should have a free hand in the matter of working-up residual products, whether produced in their own plant or bought from other undertakings. It must be obvious that it would not be economical for every gas-works to instal (say) a complete tar distillation plant or an acid-making plant, or even, in some cases, a sulphate of ammonia plant; and I cannot conceive that any Committee in the future will find it possible, in reason, to object to giving permission to gas undertakings to make their own arrangements for dealing with residuals as they may think best. In this connection, there may yet be some interesting evidence given in regard to the relations between tar distillers and gas undertakings.

I would venture to express the hope that the attitude of the chemical manufacturers may undergo such a complete change that, instead of opposing the reasonable efforts on the part of the gas undertakings, they will come along and, from feelings of patriotism and fairness, will assist the undertakings to secure the powers they so evidently require for the country's good.

FUTURE OF LABOUR.

The question of the future of labour is present in all our minds, and well it may be; for it probably will be the greatest and most difficult question which will have to be faced. It would not be wise to put down in print all we hope and all we fear; but the introduction of labour-saving machinery wherever possible is a safe recommendation.

REMUNERATION OF ENGINEERS.

As a "free lance," with no axe to grind, I may be allowed to express a hope that directors and committees, who have been so generous to their workmen, will not forget their engineers at the proper time. They are, like everyone else, feeling the burden of increased cost of living and taxation, and, in addition, have had, and are having, a most anxious time; and it is largely due to them that things are kept going.

THE FINAL WORD.

Many other topics might have been touched upon; but I have imposed a time-limit on myself. The general rule at the spring meeting has been to have general business and the President's Address. To-day we have, in addition, two papers on engineering subjects; and I cannot occupy more time without being unfair to the writers of the papers. If I have kept you too close to the war, the other part of the programme will come as a relief.

A Vote of Thanks to the President.

Mr. A. F. Browne (Vauxhall) said he felt that he was a privileged individual in having been given an opportunity to move a very hearty vote of thanks to their President for his most

patriotic, instructive, encouraging, and entirely up-to-date Presidential Address. There was a rule that it was not good form to criticize a Presidential Address; but he must say that from the very first paragraph, he was profoundly impressed with the patriotic tone, which was continued in the other parts. The members need not assure Mr. Gibb of the pleasure it gave them to see him occupying the chair of the Association. One of the previous speakers had referred in a very nice way to their President having occupied the chair of the Institution of Gas Engineers, which was the highest honour it was in the power of his professional colleagues to place upon him. Mr. Gibb had lived some years since that time. He (Mr. Browne) remembered his occupation of the chair very well. The experience he then had had already been wide; and it had since become wider still. He thought the members were very fortunate in being able to send Mr. Gibb back again to the Council of the Institution, where, he was sure, he would do fully as useful work as he did in the old days. They were also fortunate, from the point of view of the social side, in having secured Mr. Gibb as their President. Those who had the privilege of knowing him as thoroughly as he did, were fully aware of the charming and genial side he possessed, and what an all-round good fellow (if he might respectfully use such a term) he was. He thought the High Explosives Committee were to be highly congratulated upon having, during this war crisis, obtained the services of Mr. Gibb, who was so thoroughly acquainted with the gas industry. There was much in the address which would be useful to them all and to the industry.

Mr. F. W. Cross (Lea Bridge), in seconding the motion, said that, towards the close of the address, the President remarked that he had cut it short, in order to leave room for the discussion of the two papers; and it then flashed across his (Mr. Cross's) mind what a lovely paper the address itself would have made for discussion. There were topics throughout it which made one think of discussion.

The motion was carried with acclamation.

The President thanked both Mr. Browne and Mr. Cross for the very kind things they had said. Especially gratifying to him were Mr. Browne's remarks; and some part of the gratification was due to the fact that, he thought he might say, they were tried friends. It had been a source of gratification to him since he came to London to always know that in Mr. Browne he had one of his greatest friends, and one whose advice he knew he could ever have at hand, and whose advice he always knew would be absolutely sound in every particular. He thanked Mr. Browne also for his reference to a personal side of his (Mr. Gibb's) character. If it was true he had a bright social side, and he could carry it along with him into what Mr. Browne mentioned in his next expression—high explosives—it would appear that he (the President) was fairly evenly balanced. [Laughter.]

The May Meeting.

The President observed that there was one informal matter to which he had to refer. In peaceful times, there had always been a May meeting, which was looked upon as a trip meeting. The Committee were rather doubtful as to what might be the best thing to do under the circumstances of this year. Various suggestions had been made. One was for them to have a visit to a place in London or the neighbourhood, and then, instead of having a programme especially arranged, have informal discussions upon various subjects. For instance, members might send in some suggestions, and the Committee from them might select half-a-dozen suitable topics. Then the members could be prepared to have a regular "dust-up" upon the questions selected. The matter was, however, left quite indefinite. It had also been suggested that perhaps arrangements could be made for the members to go over a Government factory. It was difficult enough at the present time to get one or two people through a Government factory, but to get sixty or eighty through, he was afraid, was not possible. However, if the arrangements for the May meeting were left to the Committee, they would do the best possible under the circumstances.

Papers and Discussions.

[See Pages 637-42].

The two papers held over from the previous meeting were then read and discussed. They were by:

Mr. F. Durkin, on "Extensions at the Southampton Gas-Works."

Mr. W. D. Child, on the "Construction of Concrete Purifiers at Romford in 1913."

It was mentioned by the President that Mr. Child unfortunately could not be with them that day. He was in hospital at the present time, but was progressing well. Mr. Durkin's paper would be taken first; and Mr. Child's paper would then be read by the Hon. Secretary.

At the close of the discussion on the papers,

Mr. Samuel Glover proposed a vote of thanks to the authors. In Mr. Child's absence, he thought it was only justice to him to say (and he knew Mr. Broadberry would understand) that they should keep in mind the fact that he did not build his design of concrete purifier box as an example for Mr. Broadberry to go by for works of his size. Mr. Child had put in these small boxes for works of the size at Romford. He had utilized the thrust of the earth to help to hold them in their place, and to get support for all the weight of cement which he got in at the bottom, and the thrust on the outer side walls was also carried back to the ground. Mr. Child had been good enough to, as Mr. Broadberry said, offer his experience of what he had done at the Romford works under the circumstances in which he was placed; and they were obliged to him. It was quite evident they were to hear more of this subject. He would suggest that the continued gas-tightness that had been looked for in the boxes should be carefully studied—as to whether the "Ironite" used would not suffer with the chemical reactions that went on inside the box, and would no longer remain "Ironite" as put on the inside of the box when new. If with their ordinary boxes the iron was eaten away, and nothing but the carbon of the iron was left behind, he did not know how the "Ironite" was going to maintain a gas-tight hold of the surface of the concrete boxes. He thought this was one of the points they might fear—that, although they started with a gas-tight concrete box, it might not remain gas-tight, unless the pores of the concrete gradually became stopped up. If they wanted a gas-tight concrete box, why not put an elastic gas and water tight lining between the inner and the outer coatings of concrete, as some of them had done in making gasholder tanks water-tight?—for instance, some elastic pitch or asphaltum, which could be continued from the bottom layer to the top layer, and so make an absolutely water and gas tight envelope. No reaction could get to it to affect it or to get it out of its place. To the authors of the papers, they tendered their heartiest thanks.

Mr. G. M. Gill (South Metropolitan Gas Company), in seconding, said both papers would be valuable for record purposes. As a matter of interest, he might mention that many years before reinforced concrete was introduced, Mr. Henry Jones constructed some concrete purifiers at the Wapping Gas-Works; and these did good service for a number of years. He had heard that ordinary concrete was used, and that the boxes were not absolutely gas-tight. As the walls of the purifiers formed the boundary wall of the works, he believed it was a favourite amusement of the small boys in the street to light up the little jets of gas escaping outside.

The President mentioned that a message had been sent to Mr. Child regretting the cause of his inability to be present.

The motion was heartily passed.

Mr. Durkin having thanked the members, the business proceedings terminated.

The members afterwards had tea together, over which some time was spent in friendly intercourse.

Army Contractors and Badges.

It was pointed out by the War Office, in a statement issued at the end of last week, that in granting badges for the purpose of protecting the indispensable labour of firms engaged on important contracts for them, the importance has never been overlooked of securing every available man for the army; and, as a matter of fact, when the Derby scheme was started, the issuing of badges was to a great extent abandoned, in favour of the alternative plan of attesting and appealing when called up. Firms adopting the latter policy received a letter, which could be shown to the Tribunal, pointing out that they held contracts for the War Office which must not be jeopardized, but also stating that the indispensability of any individual must be determined by the Tribunal. It has now been resolved to withdraw from contractors any badges which may be found to be no longer required; and to attain this end, a systematic inspection is being made in the case of firms whose employees have received badges. In this connection, it seems, the officials have been instructed to pay special attention to the necessity of withdrawing badges from eligible single men in all cases where they can be replaced by men over age or otherwise disqualified for service, or by women. In certain quarters, the suggestion has been made that the issue of the letter may have led the Tribunals to adopt a too liberal policy of exemption; and therefore all firms to whom the letter was sent are also being visited, to make sure that only men absolutely indispensable for war work have been put back. Further badges will only be issued in cases in which the Army Contract Department have satisfied themselves by inquiry as to the indispensability of the men for whom the badges are desired.

Sulphate of Ammonia Export Prohibition.—According to Saturday's "Chemical Trade Journal," at a recent meeting of the Council of the Newcastle Chamber of Commerce the Secretary announced that he had ascertained that the prohibition of the export of sulphate of ammonia would remain in force for at least two months.

Proposed French Patent Legislation.—There has been published, says the "Board of Trade Journal," the text of a Bill introduced into the Chamber of Deputies by the Minister of Commerce which has for its object the extension of the legal periods for which certain patents would normally remain in force. The Bill provides that the duration of patents of invention which, in the normal course of things, would have expired on or after Aug. 1, 1914, or which would have expired before a date to be fixed by Decree after the cessation of hostilities, will be extended until a date to be named by the same Decree. At the same time, those who, in good faith, before the promulgation of the proposed law, have infringed a patent to which the law will apply, will not be liable to be proceeded against, nor will they be bound to cease working the invention.

EXTENSIONS AND IMPROVEMENTS AT THE SOUTHAMPTON GAS-WORKS.

By F. Durkin.

[A Paper Read before the Southern District Association of Gas Engineers and Managers, March 16.]

It may be of some interest to members to describe the extensions and improvements to the carbonizing plant of the Company with whom I am connected, and a comparison of the results obtained. It is frequently by independent testimony of working results contributed by members of Associations, that others may be helped to some decision when they have to extend their plant.

Stoking Machinery.

Up to August, 1907, we only had hand-charging by scoop work. Stoking machinery had been considered on more than one occasion; but to have adopted it in all the retort-houses would have been costly—necessitating a machine in each of two for only eight settings each, all circular retorts, 16 inches diameter and 20 feet through. Another house of twelve settings of the same description of retorts was eventually adapted in the year 1907 for machine stoking by De Brouwer's arrangement, and was the means of some saving. But it still necessitated hand-charging as well in the other houses some part of the year; and all the coke therefrom was dealt with by hand labour.

Horizontal v. Vertical Retorts.

The time came, however, owing to increased wages, for something more to be done; and I was requested to go into the matter. In 1912, it was finally decided, after due consideration of the merits of both horizontals and verticals, to build a new retort-house for 20 feet through horizontal retorts (on account of their known advantages over verticals), and with regenerative furnaces. It was felt that their working was a certainty with the half-dozen kinds of Durham coals carbonized against a somewhat limited knowledge of the more recent rival, and that the other houses might at some future time be adapted for verticals, when a more extended knowledge of their working and duration would possibly be known.

Skeleton plans were prepared, showing the site and outlines of the buildings (with dimensions), to give some idea of what was required.

Three firms were invited to tender and submit designs. One, that of Messrs. Aldridge and Rankin, was selected, which seemed to best fill our requirements.

The Retort-House.

The land available for the extension enabled the following erections, constructed on concrete foundations, starting on the gravel 4 to 5 feet below the ground line, for supporting the more important parts of the building and settings, and arched beds of concrete of less thickness at other points started on the solid ground, with the before mentioned for abutments.

A steel-framed stage-floor retort-house was erected, 209 ft. 2 in. long by 57 ft. 8 in. wide, inside dimensions, by 41 ft. 6 in. from ground line to eaves; a suitable arrangement being employed to allow for expansion and contraction of the benches and stage floor, &c., free of the main building. H section steel standards support the roof principals. The roof is boarded and slated, with a ventilator the length of the house along the line of the ridge.

Brickwork filling is provided for the sides and ends of the house, and piers formed at each standard, with 4½ break inside and out, set in cement where in contact with ironwork, and 9-inch panelling between, bonded, and set in mortar. Suitable openings for ventilation are formed in the panels of the front elevation, with semi-circular arches, 9 inches deep, in rubbed bricks, and a concrete keystone to give the front elevation a finish.

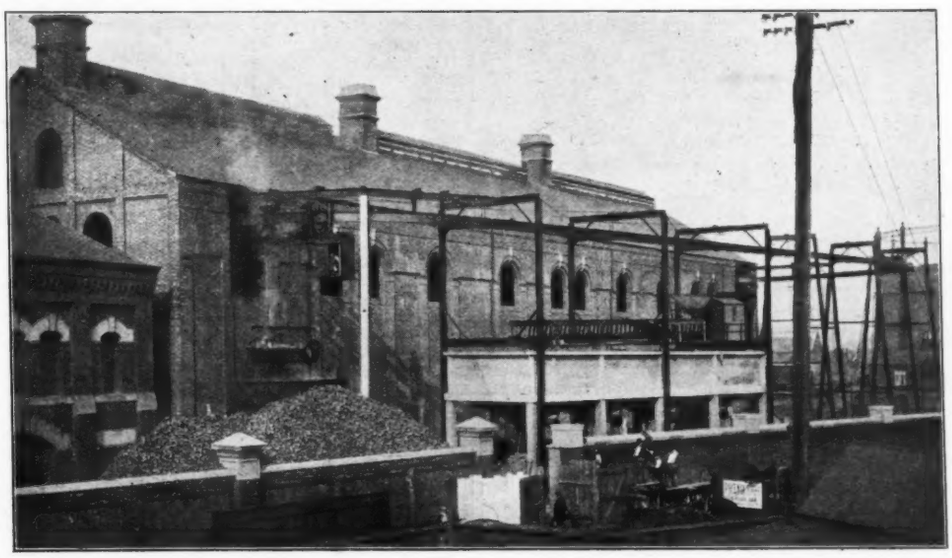
There are three benches, 61 ft. 6 in. by 20 ft., each with its own chimney, 70 feet high from the ground level, separate from each other and the end walls. In front of the settings there is a space of 20 feet on the machine side, and 17 feet on the discharging side to the side walls. Six settings in each bench contain eight D retorts 23 in. by 16 in. in four tiers, and a furnace to each, fed on the discharging side. These settings have worked very satisfactorily, giving an equal heating throughout.

The capacity of the house is about 192 tons per day. The duration of the charges is eight hours for the three upper tiers, and twelve hours for the bottom row. The area of the retort-house is 62½ square feet per ton of coal carbonized.

Coal Store Adjoining.

This is excavated 8 ft. below the ground line, and is 209 ft. 2 in. long by 30 ft. 1 in. wide by 15 ft. 6 in. deep. It has a separate roof from the retort-house; the 9-inch division wall being common to both. The exterior walls are plain; piers enclose the steel standards; and 9-inch panelling between, with large openings for ventilation in the coal-store so as to economize brickwork. The store holds 3500 tons of coal, and thus the area per ton of coal carbonized is 33 square feet.

A coal breaker and elevator, arranged near the middle of the store, handle about 20 tons per hour. A telpher grab, with a capacity of 22 cwt., feeds the breaker; and a track all round the store enables coal to be picked-up from almost any point. During the delivery of coal from a steamer, the breaker is fed by side-tipping waggons, and the telpher is used for stacking the coal. The elevator delivers coal on to either one of the two sections of conveyors (of push-plate type) in line with the three sets of continuous hoppers holding, when full, 12 hours' supply. The stoking machine is the Fiddes-Aldridge simultaneous discharging charger, and actuates the coal-hopper doors in its travel, taking in the charge from the overhead hoppers for each retort.



THE TELPHER PLANT AND COKE-QUENCHING PLANT AT SOUTHAMPTON.

The mouthpieces are self-sealing, with screw-tightening for the three lower tiers, and lever type for the upper. The ascension-pipes are 6 inches diameter on both sides. The dip-pipe ends are bevelled, and all of one length. The hydraulics are of the sloping bottom type, with two settings to a section, supported on cross girders, which also form ties to the buckstaves. The 6-inch tar and liquor pipes connect-up each section of the hydraulics, and fall to the tar-towers fixed at the end of each bench, with a seal regulating valve on each tower. At the stage floor, tar draw-off valves drain into tundishes; the latter connecting to drains falling to the underground tank. Along the centre of each bench a 15-inch steel main connects with branches having valves to each section of the hydraulic for the gas take-off. On the outlet of each steel main there is a 10-inch governor with inlet, outlet, and bye-pass valves connecting to a 20-inch branch, thence to a 30-inch conducting main extending the length of the house.

Coke Handling.

Coke handling is done by means of a telpher, the track for which extends the length of the house, and curves out of it on the side near each end. Owing to the curves, track points had to be used to deal with coke from the end settings. Coke is quenched

in a cast-iron tank outside at each end, but is by no means an ideal arrangement.

The telpher track outside the retort-house forms a circuit of the coke yard, and coke is deposited either to the heap, or screened on a jigging conveyor before dropping into ferro-concrete bunkers underneath, arranged to catch breeze, coke of broken size, and large coke.

Power.

The whole of the plant is electrically driven; power being generated by a 95 B.H.P. gas-engine, with flexible direct-coupling to a 50 KW. dynamo. A mechanical water cooler, driven off the engine-shaft is used for cooling the circulating water for the engine jacket. A duplicate power set has recently been installed.

The work was carried out under one contractor. It was commenced in the autumn of 1912, and the first bench charged in September, 1913.

Results of Working.

The comparison of results between the old working and the new is as follows.

The average production per ton for the half year prior to the starting of the plant in the direct-fired settings was 12,000 cubic feet; in the half year to June 30, 1915, it was 13,500 cubic feet; and in the six months to Dec. 31, 1915, it was 14,000 cubic feet.

Average cost of hand charging	5d. per 1000 cubic feet
Average cost of machine and hand charging	4·11d. ,, ,,
First half of 1915, machine only	1·21d. ,, ,,
Second half	1·18d. ,, ,,
Fuel used, direct fires	Over 30 per cent. of the coke made
Fuel used, regenerators	15 to 16 ,, ,, ,,

A corresponding advantage has been gained for coke and breeze sold per ton of coal carbonized by at least 2 cwt. more.

A Twenty-Four Hours' Test on the New Plant.

July, 1914.

Illuminating power	12¼ candle power, No. 2 "Metropolitan"
Calorific value	510 B.Th.U. gross
Production	12,000 cubic feet

May, 1915.

Illuminating power	12·4 candle power, No. 2 "Metropolitan"
Calorific value	508 B.Th.U. gross
Production	14,500 cubic feet

October, 1915.

Illuminating power	13·0 candle power, No. 2 "Metropolitan"
Calorific value	510 B.Th.U. gross
Production	14,500 cubic feet

Three gangs of men are employed per 24 hours. Each gang consists of a foreman and eight men for charging and discharging operations. Coal handling requires two men during the daytime only.

I think you will agree that these figures justified the extension; and it is a fortunate circumstance to have completed the work before the present labour difficulty.

General Reflections.

With regard to the regulation of the heat in the settings, I wish to record the advantage we have derived by the use of the Fery pyrometer.

Figures published of the make per ton produced by various undertakings rarely state what coals are carbonized. My first question when any comparison is made is to know this point; for it is hardly fair to compare the results of an undertaking using (say) South Yorkshire coal with another works using a poorer kind. One should get good results easily; the other hardly hopes to get the same results even with close attention to the working of the retort-house. But the result given above at any rate for the production per ton is not so far behind.

On the matter, too, of production per ton, I am not sure what the general practice is. But with large stocks of coal, it seems advisable to work for some margin over and above book stock for emergencies, and only show a moderate rather than a full production.

For a good many years, we were satisfied with having a jet photometer at the outlet of the purifiers; and then some years later it was adopted at the outlet of the exhausters. But a good deal may happen between the retorts and exhausters. On one occasion I remember some settings were charged in the early afternoon; the hydraulics had been examined and water-lined in the morning; but for some unexplained reason the water was not there; hence the jet told the tale of something wrong at a fairly early stage. But how much better it would have been if the same jet had been at the outlet of the bench, and saved yards of the condensing mains from being filled with a poor mixture, to say nothing of what may happen at the purifiers.

The difficulty is that the outlet main from the settings is under a vacuum; but I am glad to say this has been overcome in our case. With some suggestions from myself, two of my assistants have devised means to give pressure to operate a jet photometer, also a water-weighted retort-house governor having a loading and unloading device controlled from the stage floor. The jet photometer indicates the quality, and a vacuum recording gauge shows the pull on the inlet of the governor. It has proved an ideal arrangement for the control of quality and make per ton.

When a series of retorts are charged, gas is evolved over a period at a rapid rate. By means of the above apparatus, the governor is regulated to cope with it; and the gas leaves the retort quickly, without an accumulation of pressure within the retorts. Thus over some periods as much as 15-10ths to 20-10ths vacuum can be maintained.

When the rush of gas is over, the jet indicates it, and the governor is operated accordingly.

DISCUSSION.

Mr. C. F. Botley (Hastings) said that he thought it might be fairly granted that, as compared with hand-charging, Mr. Durkin had more than proved the case for his new plant. But there were one or two points upon which he (Mr. Botley) would like some further information from the educational point of view. He imagined that in the one house the De Brouwer arrangement was confined to discharging, and that the charging was done by hand. [This was corrected by Mr. Durkin in his reply.] In regard to the general figures, it was always useful for one to compare the results of any works with his own. It happened that his retort-house was of very much the same capacity as that Mr. Durkin had erected; but the Southampton house was built for machinery on one side only, while the house at Hastings was designed for utilizing machines on both sides, and even for verticals, if thought expedient, one of these days. The result was that his square feet per ton of coal carbonized was considerably in excess of that at Southampton; and the same remark applied to the provision for coal storage—45 square feet, as against Mr. Durkin's 33 square feet. The methods of handling coal differed in various works. In his own case, the coal came in trucks, and was discharged direct into the retort-house; and it was not his habit to work in and out of stock. He believed that at Southampton, the coal came in by steamer; and they had to work in and out of stock, and the design was made to suit this condition. He was, however, struck by Mr. Durkin's low cost for coal handling. This was done very cheaply indeed. There were only two men to keep the house going; and they did all that was necessary within ten hours' work, or apparently so. He should like to have the actual cost per ton. In regard to coke handling, he should like Mr. Durkin to tell them whether he found the operation of the telpher caused any delay in the working of the house. Also what was his production of breeze per ton; and in what respect he was condemning the method he employed of entirely dipping the skip for quenching in a tank outside the retort-house. As to the results given in the paper, it was a wonderful record of what could be done by strict application of modern principles to the working of a retort-house. He took it that these results were largely due to the contrivances that Mr. Durkin and his assistants had introduced. In these days, he thought they were all aiming at getting the best calorific value out of the coal carbonized. It was their duty to do so; and thereby do the best possible for their undertakings, and help to husband the coal resources of the country. Taking the tests as given, he had worked out the figures on the B.Th.U. per ton basis. He found that in July, 1914, the figure was 6,120,000 B.Th.U. per ton; and in October, 1915, it was up to 7,395,000 B.Th.U. per ton. This was a remarkable result; and he took it that it was open to most of them to get a step forward in this respect. But if one wanted information on a matter of this kind, it should be upon a proper basis; and it was therefore necessary to know what coal was being used. He also preferred to take figures for a half year, rather than for an isolated test, or even for the various periods Mr. Durkin had taken. Last half year, using such Durham, Yorkshire, and other sorts of coal as he could obtain (he really did not know what some of it was), he got per ton 12,600 cubic feet of 13-candle gas; but this did not compare with Mr. Durkin's figures on the calorific basis. He remembered a test that Mr. Thomas Goulden conducted on the calorific basis to see what could be done in making 12-candle gas. He believed the highest figure he obtained per ton of coal was 8,395,000 B.Th.U.* Mr. Durkin was to be heartily congratulated upon the results he had achieved.

Mr. F. W. Cross (Lea Bridge) remarked that Mr. Botley had mentioned that the super-area of his house was higher than that of Mr. Durkin. As a matter of interest, he (Mr. Cross) worked out the super-area of his vertical retort-house that morning; and it came out at 36 super feet per ton. This was a matter of interest rather than of criticism. As to the average costs that Mr. Durkin gave, he should like to know what he included as charges. It was rather important they should know how far he went with his wages bill, because a total figure conveyed nothing to them unless they knew something as to the constituent items.

Mr. W. N. Westlake (Exeter) congratulated Mr. Durkin on the results he had achieved. To have reduced his labour charges from 5d. per 1000 cubic feet to 1·21d. was an attainment of which he might be rightly proud. This tended to reduce the cost of the gas, and thus to extend its use. He (Mr. Westlake) had recently had some experience with improved plant. But unfortunately he had not had an opportunity of making a long test, because the plant was only sufficient for part of their make; and it was only in the summer he had an opportunity of making anything like a complete test. His experience with hand charging compared very favourably with that of Mr. Durkin. It used to

* See Presidential Address to the Eastern Counties Gas Managers' Association in October, 1913.

cost him 5d. They got it down (not, however, in war time) to slightly over 2½d. During a month's test of the new vertical plant last summer, they were able to get the labour charges down to 1·16d. per 1000 cubic feet made; and at that time the whole of the bench was not in operation, because they then only required about four-fifths of the gas that it would produce. The figure was the actual wages paid for the month; and it included the stokers, scurfers, and exhauster men. Mr. Durkin might like to know this. If the output of gas had been sufficient in that month to have utilized the whole of the bench, the labour charges would have been down to about 1·04d. per 1000 cubic feet, because they would not have wanted any more men for the extra output.

The PRESIDENT (Mr. W. Doig Gibb) added his compliments to Mr. Durkin for having written such an interesting paper. It was one that appealed to every one of the members. Upon the question of horizontal *v.* vertical retorts, he expected to have heard an animated discussion. Applicability of system largely resolved itself into a question of the relative size of the works. One point in favour of verticals was that they were self-contained; and therefore in a place where extensive machinery could not be applied, it might be quite proper to make a vertical installation. A vertical installation for a given output also occupied less ground space; and this was a consideration, if they were hampered for room. Every different question had to be weighed on its own merits. If Mr. Durkin would allow him to say so, he did think the time had passed when it could be said that the experience of the working of verticals was so limited as not to justify anyone going in for them if conditions pointed to them being a paying acquisition.

Mr. W. E. PRICE (Hampton Wick) asked Mr. Durkin if he would explain the last but one paragraph, as to the means devised to give pressure in the retort-house.

Mr. DURKIN, in reply, said in reference to Mr. Botley's remarks, he thought he made it quite clear that the De Brouwer machinery comprised a charger and discharger. With regard to the coke telpher, it did not delay the operations. When the charge started, the skip came in; and the spent charge from the first retort was pushed into it. During the time the telpher was away, the charge from the next retort was pushed into the furnace.

Mr. BOTLEY: How long is the telpher away?

Mr. DURKIN said he had not timed it, but possibly between two and three minutes. With regard to breeze, he was sorry to say they made rather a lot, due to two things—the drop of the coke into the skip, and the cooling by water in the tank. The skip being lowered into the water broke the coke down very much, and shot it all over the place. Consequently, there was a lot of breeze with which to deal. A question was asked as to the kinds of coal he used. They were principally West Leverson, Pelton Main, and Holmside; and quite occasionally Thornley, Wearmouth, and Horden. There were, therefore, half-a-dozen Durham coals, which were handled in any proportion they liked. Holmside coals were found to be the best. As to the costs per 1000 cubic feet, they had three gangs of eight men (including the foreman), and the coal was handled by two men. As to Mr. Westlake's remarks, there was a difference between the wages in a seaport town and an inland town. In the former, the wages were naturally higher. Mr. Price asked a question about the pressure in the retort-house. Some time ago he wrote to a firm asking them if they could recommend him some means of producing pressure in the retort-house. They suggested a small water-motor. This did not quite meet the idea, because it required some sort of motive power. The pressure was now produced by water. He did not think it was divulging any secret to say that it was on the principle of the water-pump—a jet of water being made to produce the pressure of the gas. He might remark incidentally that the water, being in contact with the gas, took out a little of the ammonia.

CONSTRUCTION OF CONCRETE PURIFIERS AT ROMFORD IN 1913.

By W. D. CHILD.

[A Paper Read before the Southern District Association of Gas Engineers and Managers, March 16.]

I had for some time given consideration to the question as to whether the construction of purifiers in their simplest form—*i.e.*, when resting upon or sunk into the ground—might not be more economically effected by the use of portland cement concrete than with the usual cast-iron plates.

Having become acquainted with the "Winget" concrete block-making machine and the variety of material that may be produced by its use, I resolved to go more closely into the question of the cost of concrete construction. By using suitable proportions of crushed clinkers, breeze, sand, and portland cement, I found that blocks measuring 32 in. by 9 in. by 9 in. could be produced at a cost of 10d. each, and quoin blocks, closers, and other shapes at proportionate rates. By the use of these blocks, the construction of the purifier boxes would be carried out without the erection of any timber framework, or shuttering, and in this way, considerable economy would be effected.

During the winter of 1912, the make of gas at Romford had increased to such an extent that the oxide purifiers, 16 ft. by 16 ft., then in use, would only run about 24 to 30 hours without requiring to be changed—principally on account of heavy back-pressure, which would rise as high as 28 inches, with great risk of gas blowing at the water-lutes of the boxes in which the covers were sealed. These purifiers were erected when the works were built in 1892, at which period the make of gas was about 30 million cubic feet per annum.

I therefore prepared plans and estimates for the construction of a set of four concrete purifiers, each 30 ft. by 20 ft. by 5 ft. 6 in. internal dimensions, with 18-inch cast-iron pipe connections to a Weck valve. Having submitted these plans, &c., to the Directors of the Company, and secured their approval, tenders were invited for the necessary cast-iron coping plates, steel luteless covers, Weck valve, connections, &c. The work was put in hand in June, 1913; the Company undertaking the erection of the concrete boxes, while the ironwork was in the hands of well-known contractors.

An excavation was made approximately 88 ft. long by 33 ft. 2 in. wide and 6 ft. deep; the sides being cut truly vertical, and the bottom accurately level. Over the whole surface of this bottom, portland cement concrete, 18 inches thick, was placed in two layers, each 9 inches thick.

To ensure a level bottom, two parallel lines of 9 in. by 3 in. deals were placed 16 feet apart along the whole middle length of the excavation, the upper edges of the deals being truly level. This centre portion of the bottom was completed first, and when set served as a guide for putting in the side widths.

The 9 in. by 3 in. deals were then again placed in position 15 feet apart, so as to break-joint with the bottom layer; and in placing the concrete in position, the surface was at once faced with a finer and richer concrete, so as to form a conglomerate mass of perfectly level concrete, requiring no surface rendering—the latter having a tendency to scale-off. Upon this level bottom, the outside and the division walls were distinctly marked out, and the builders commenced setting the concrete blocks.

The outer walls were faced on the inside with blocks 9 inches deep and 9 inches wide, with quoin blocks built in to bond with the division walls; and these blocks were backed-up to the solid earth with 9 inches of mass concrete. This was put in when each two courses of blocks had been set in position.

The division walls were built with blocks 9 inches deep by 8 inches wide, set 2 inches apart; the space being filled in with portland cement grout, forming a solid wall 18 inches thick. When the work arrived at the proper height, this space was used to receive the holding-down bolts of the cast-iron coping plates. The bolts, being accurately placed in position, were then grouted-in solid.

At the positions shown on the photos., two courses of Staffordshire blue brick were built into the walls with 2-inch projection; and these served to support the ends of grids carrying the purifying material. The bearing bars for the wood grids are supported on concrete corbel blocks, built into the walls.

As soon as the walls were raised to the full height, the upper surface was rendered with good portland cement compo ¾ inch thick; and when this had thoroughly set and dried, it was painted with boiled oil to form an adhesive surface for the jointing material used in bedding the cast-iron coping plates.

To ensure the concrete walls of the boxes being gas-tight, the whole of the inner surface was dressed with "Ironite." This material is, I believe, composed of the finest iron dust that can be separated from cast-iron borings by a blast of air at a pressure sufficient to blow the fine particles, having a certain gravity, into a receiver, as the borings are poured down in front of the air-nozzle.

The iron dust is no doubt mixed with sal ammoniac, &c., in the same way that borings are prepared for an ordinary rust joint. The "Ironite" is mixed with water in a pan in small quantities, kept constantly stirred, and applied to the face of concrete with a stiff brush, stippling it well into the pores of the concrete. For the work in question, I used two coats—allowing the first coat to rust and dry before applying the second—and in this way secured a sound job.

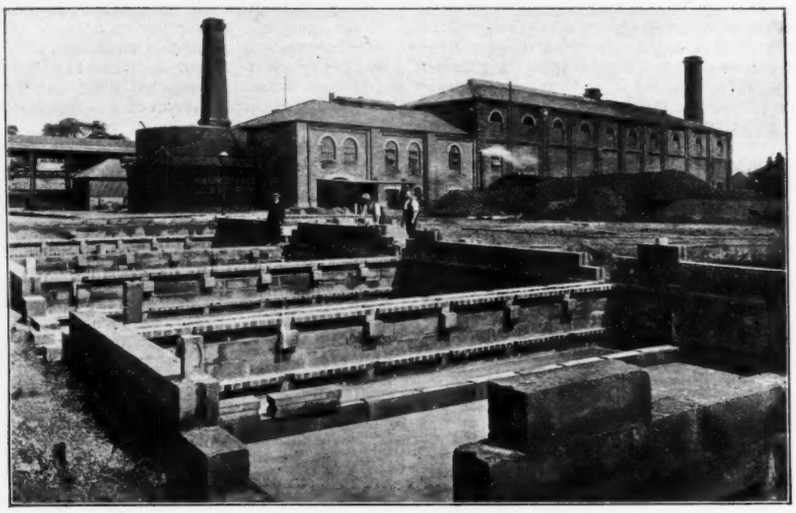
I used the "Ironite" in preference to cement rendering. The method of application fills up all cavities in the concrete, and chemical and mechanical union takes place between the "Ironite" and the surrounding surface with but little probability of any subsequent parting, as frequently occurs with cement rendering.

COPING PLATES.

The coping plates of cast-iron were designed (as shown in the photos.) about 5 feet in length and 1 ft. 9 in. wide, with a rounded nosing overlapping the outer edge of the wall. The inner edge of the plate was turned upwards, raised slightly above the depth of the flanges, and planed to a true surface, to form a continuous bearing for the jointing material of the luteless covers. Guide pins were accurately fitted and driven in, to bring the bearing surfaces truly together, when the plates were bolted in position.

The jointing material used for the covers was a specially prepared hemp gaskin, 1½ in. by 1 in., square section, with tallow worked in, in the course of manufacture.

The boxes were divided longitudinally by a gangway, formed with two 15 in. by 4 in. by ½ in. steel channels (weight 42 lbs. per foot run) riveted together, and with 5 in. by 4 in. by ½ in. angles, riveted to the outer edges of the channels to form a bearing surface for the covers of the boxes. The gangway was designed to cut the boxes in two, so as to reduce the size of the covers, and also to



THE CONCRETE BLOCK FOUNDATIONS FOR THE PURIFIERS AT ROMFORD.

form a roller path for a travelling crane with extended arms to lift two covers at the same time.

Owing to labour troubles, there was a good deal of delay with the work, and the type of crane as described was discarded, and an overhead gantry, with traversing cranes, to lift and travel one cover at a time was erected in its stead.

Two cast-iron standards were fixed in each purifier, to give support to the gangway to which they were riveted, and the feet of the standards were securely anchored to the concrete bottom, to resist the lifting strain, caused by the pressure of the gas on the underside of the covers when in action.

Bearing Bars.

The bearers to support the lower tier of wood grids were 6 in. by 4 in. pitch pine, supported on brick blocking at 5 feet intervals. The upper tier of bearing bars was formed with two 9 in. by 3 in. deals, bolted together, with an 8 in. by $\frac{5}{8}$ in. steel flitch plate between. The $\frac{1}{2}$ inch space top and bottom was run full with hot pitch and tar to protect the steel flitch plate. These bearers were supported on concrete corbel blocks, built into the walls, and were strong enough to carry the wood grids and purifying material with no intermediate support between the walls.

Wood Grids.

The grids were formed with strips of 6 in. by 1 in. rough deal, kept at their proper spacing by being nailed to $1\frac{1}{2}$ in. by 1 in. battens. These grids were supplied at a lower cost than the usual bevel-bar grids in hard-wood frames. They give a good surface for shovelling upon, afford a very free passage for the gas, and have no tendency to clog with the purifying material.

The pipe connections were arranged for a downward flow of gas through the boxes, and tubes and cocks were fitted so that gas tests on pressures may be taken at each layer of material.

Pipe Connections.

The whole of the socket joints of the 18-inch connections between the Weck valve and the boxes were made-up with tallow joints.

Rings of white yarn of suitable length were prepared by being soaked in a mixture of white lead, vegetable oil, and tallow, and then allowed to dry. The rings were caulked into the socket in the usual way, leaving a space about $2\frac{1}{2}$ inches to the face of the socket. Another ring of prepared gaskin was then tucked in just level with the face of the socket, leaving an annular space about 2 inches deep. When caulking in the last gaskin, a gate was left at the top of the pipe, and through this a mixture of hot tallow and linseed oil was poured in sufficient to fill the annular space.

I became acquainted with this form of joint at Yarmouth many years ago, and have always used it when fixing heavy valves, &c., as, by the elasticity, it relieves the socket from strain; and with pipes of large diameter, it is much cheaper than the lead joint. Full particulars of this method of jointing may be found in the "Journal of Gas Lighting" for Nov. 18, 1879, p. 781, in a paper read before this Association by Mr. H. Townsend.

Details of Costs.

In adopting this form of construction for the purifiers, my object was to reduce the capital expenditure as much as possible, and I believe the details of the actual cost [see next page] will show this to have been successfully accomplished.

The prominent features of the work to which attention may be drawn are:

Use of concrete blocks, dispensing with all timber framing.

Coating with "Ironite" to render the concrete gas-tight.

The use of timber for bearing bars in place of steel, which rapidly deteriorates through contact with oxide of iron.

The type of wood grids adopted for use, and jointing all connections with the tallow joint.

As regards the working of the purifiers, they were put into operation on May 9, 1914, and ran continuously till Sept. 28, 1915,

THE CONCRETE BLOCK WALLS FOR THE PURIFIERS AT ROMFORD.

Cost of four concrete purifiers, each 30 ft. by 20 ft. by 5 ft. 6 in. internal dimensions, with cast-iron coping plates on walls, channel steel gangway, eight steel covers, bearing bars, wood grids, (5100 feet super.), Weck valve, 18-inch pipe connections, also steel gantry and overhead traversing crane for lifting and travelling covers.

	£	s.	d.
Earthwork excavation at 2s. 1d. per cubic yard . .	24	2	7
Labour putting in concrete bottom . . £19 19 0			
Clinkers, breeze, sand, and cement (average 12s. 6d. per cubic yard) 67 12 6			
	87	11	6
Cement, breeze, and sand for block making. . . .	33	15	4
Labour for block making	12	17	3
Cement compo for laying blocks	3	10	10
Skilled labour, setting blocks	13	9	3
Rough labour, moving blocks	14	16	4
Labour, cement, and other material, used in concrete backing for walls, &c.	49	9	8
Cartages, July, August, and September	3	18	6
Ellis and Co., sample grid	0	3	8
Dowsing and Davis, wood grids to sample 5000 feet sup.	72	4	9
Jewson and Co., timber for bearing bars	22	12	7
Redpath, Brown, and Co., flitch plates and bolts . .	29	7	0
Labour on bearing bars	2	13	11
Iron supports for bearing bars	1	0	11
Gas Company's workmen, wages on purifiers . . .	37	15	10
" " " " on earthwork for pipe connections . .	13	3	2
" " " chipping face of walls for rendering	3	15	0
Rendering tops of walls	3	13	6
Rendering face of wall above ground	8	1	11
"Ironite" for coating walls	27	16	3
Labour, applying "Ironite" inside purifiers . . .	4	10	0
Earthwork for valve pit	1	1	7
Dowsing and Davis, building valve pit	10	0	8
Cleaning and painting covers, &c.	2	5	3
Testing purifiers with 20-inch air pressure	3	13	1
Total of Gas Company's work. . . .	£487	10	4
Contractors supplying and fixing cast-iron coping plates for walls, channel steel gangway, eight steel covers with fastenings, Weck's valve, and 18-inch pipe connections	1528	0	0
Steel gantry and overhead 3-ton travelling crane . .	239	0	0
	£2254	10	4

when I had one box opened so that I might see the condition of the purifying material.

The oxide with which the boxes were loaded, consisted of two-thirds new Irish bog ore and one-third old oxide, containing 38 per cent. of sulphur. This material, after being in use 507 days, and purifying 162 million cubic feet of gas, contained:

Top layer: Moisture 4·4 per cent. Bottom layer: Moisture 2·6 per cent.

Top layer: Sulphur 43·3 per cent. Bottom layer: Sulphur 38·8 per cent.

The order of working the purifiers had been changed about every ten or twelve days—*i.e.*, as soon as pressure began to rise; and the alteration in the order of working invariably resulted in a reduction of pressure within an hour.

As the work of emptying and recharging the boxes takes place at such long intervals of time, and the boxes stand less than 12 inches above ground, I can find no better method of doing the work than the use of the old-fashioned navvy barrow.

The cost of purification has been:

Six months ended June 30, 1913, 0·42d. per 1000 cubic feet gas sold
" " Dec. 31, 1913, 0·40d. " " "
" " June 30, 1914, 0·57d. " " "

With new purifier:

Six months ended Dec. 31, 1914, 0·17d. per 1000 cubic feet gas sold
" " June 30, 1915, 0·08d. " " "

These figures include the cost of purifying carburetted water gas in a separate set of purifiers.

My principal object, however, was, by the use of different material and method of construction to that generally employed, to reduce the first cost of the plant.

DISCUSSION.

The PRESIDENT (Mr. W. Doig Gibb) said the members were obliged to the Hon. Secretary for having read Mr. Child's paper in his absence. There were one or two very interesting points in the paper. For instance, if any member had had experience of the tallow joint, his fellow-members would be pleased to have a little information from him regarding it.

Mr. P. P. CHANNON (Hayward's Heath) said that, while they fully appreciated Mr. Child's description of his purifiers, and admired his courage in adopting such a novel method of construction, it occurred to him (Mr. Channon) that, in using wooden bearers, with flitch plates between for carrying the grids, a good deal of useful space was being occupied in the purifiers. The purifiers were 5 ft. 6 in. deep. The bottom grids were carried on 6-inch by 4-inch pitch-pine bearers. He took it there must be 3 inches of space underneath the 6-inch bearers, so that there they had 9 inches of space occupied. Then the upper grids were carried by 9-inch deals; and the wooden grids were 6 inches deep. Therefore, they had in all a space of 2 ft. 3 in. in depth taken up by the grids and the bearers. Allowing 3 inches space underneath the bottom bearers, there was 2 ft. 6 in. of space occupied, or half the depth of the boxes. With an ordinary 5-foot box, bearers of 4-inch by 3-inch T, and the usual 2-inch wooden grids, there was only a matter of 13 inches taken up by the grids and space, leaving room for two 18-inch layers of oxide and a 5-inch clearance space. Whereas with Mr. Child's construction, if he used 18-inch layers of oxide, he would be close up to the next grids, and would not allow any space for circulation. His grids and bearers were really a loss so far as purifying capacity was concerned.

Mr. A. A. JOHNSTON (Brentford) said he had had some little experience of ferro-concrete purifier construction. Before Mr. Child built his boxes, knowing that he (Mr. Johnston) had had some experience with these concrete blocks, he came and asked his opinion as to whether he thought blocks would make satisfactory purifiers. Experience up to that point had led him to the conclusion that the blocks themselves were too porous for gas-resisting purposes, especially if there was any great pressure put upon them. However, Mr. Child had the courage of his convictions and went on with the job; and he was glad to know he had brought it to a satisfactory conclusion. Since that time, he (Mr. Johnston) had had two 40-feet boxes constructed of ferro-concrete, using shuttering in the ordinary way. They had considerable difficulty at first owing to the fact that the concrete was put in in layers from time to time; and, through the unequal drying of the concrete, joints were formed between the new layers and the layers of yesterday. Ultimately, however, this was overcome; and the boxes were made perfectly tight. Now he was glad to say they were quite satisfactory. The object of concrete construction was not only to save cost, but to utilize material that they themselves produced. The cost of construction in Mr. Child's case worked out to about 3s. 5d. per cube foot; at the Southall works the cost of ferro-concrete construction, for the 40-feet boxes there, worked out to about 1s. 7d. But a great deal of the lower cost was due to the larger size. He had also put in some iron boxes on the ground, as Mr. Child had his block boxes, at a cost of 2s. per cube foot. He just gave these figures as some indication of the difference in the cost of iron construction in the ordinary way and that of concrete construction. He believed there was a big future for ferro-concrete construction. He had been using blocks for all sorts of purposes for some years; and he also thought there was a big future in gas-works for ferro-concrete construction. As to the point raised by one gentleman with regard to bearer-bars, perhaps Mr. Child did not use his oxide in layers. It was common practice in these days to fill the boxes completely from top to bottom. This was the system he himself adopted; and the size of the bearer-bars was not in this case a very great matter.

Mr. H. C. HEAD (Winchester): As I read the paper, it was fairly evident the oxide was used in layers.

Mr. A. E. BROADBERRY (Tottenham) said he was extremely sorry Mr. Child was not there, so that he could have further enlightened them with regard to many of the interesting points that occurred to one's mind in hearing the paper read. It was very useful to them that one of their members had been bold enough to make these experiments, and be willing to place the information before them—not only as a record of work done, but as a guide to follow if found good, and to avoid if not successful. Mr. Child had placed the matter before them in a very candid way. It so happened that at the present time, he (Mr. Broadberry) was particularly interested in concrete purifiers—he would not say exactly of the type that Mr. Child had adopted, because frankly he was not struck with them as being the most ideal. Mr. Child had not used reinforced concrete; he dug a hole for the boxes, so as to get the support of the earth for the walls. He used Winget blocks, which most of them knew fairly well; but they were not to his mind a good material for constructing purifiers. Mr. Child put a 9-inch concrete backing behind the Winget blocks to make a gas-tight job; but having the whole thing buried in the ground, if leakage occurred, he could only get at one side of the work, and could only get at that one side at a time when the purifier was open. Thus he would have very little opportunity of tracing where leakage was taking place. The lines upon which he (Mr. Broadberry) was working at the present time at Tottenham were very different. He had taken advantage of an opportunity of going to see the work Mr. Johnston had done at Brentford. He learned a great deal from the work; and the informaiton had been very serviceable indeed to him. Mr. Johnston had also most kindly allowed him to have copies of his drawings; and these had been exceedingly useful in the work they were at present designing. Mr. Fisher, his assistant, was present. He had had direct charge of the designing of the purifiers; and he would probably be able to tell the members more about the details of the work. If success attended it, it would be partly due to such experimenters as Mr. Child and particularly Mr. Johnston. Their idea at Tottenham was to construct overhead purifiers, supported on columns. It seemed to him that they would not have a great deal of trouble in properly constructing a gas-tight ferro-concrete floor and boxes. They were also proposing to adopt "Ironite," as a means of making the work both water-proof and gas-proof. "Ironite" was a substance they had experimented with at Tottenham for a good many years; and they had found it successful for a great many purposes. It was, in his opinion, an ideal substance for water-proofing and gas-proofing. If they erected their ferro-concrete purifiers overhead, with the walls exposed on the outside, they would be in a far happier position should there be leakage, because they would be able to get not only at the inside but at the outside of the boxes in every part; and, further, they would be

able to get at the outside under working conditions, so that, if there was leakage, it would be at once detected. Its exact location could be found, and proper steps taken to rectify the fault. If there were some other members of the Association who had any information on the subject of ferro-concrete purifiers, personally he would be very grateful to them for any hints. To a large extent in this matter, they were searching in the dark for any information regarding the subject that might be available. After they had carried out the work at Tottenham, they would be pleased to place the results before the members of this or some other Association in connection with the industry.

The PRESIDENT: We shall look forward to the paper with much pleasure. Mr. Broadberry mentioned that Mr. Fisher was present, and would probably supply further information.

Mr. FISHER said that he accompanied Mr. Broadberry to Brentford to see the purifiers there. It seemed to him that from a constructional point of view reinforced concrete was almost an ideal material for purifiers, provided it could be got gas-tight, and be maintained gas-tight. He had searched through Mr. Child's paper to see whether there was any remark in regard to the gas-tightness of the vessels. He did not say that he subjected his vessels to any severe test; and he did not mention anything to indicate that he found them gas-tight. But he did say they were satisfactory; and from this, he supposed, they might take it they were gas-tight. As Mr. Broadberry had indicated, the work at Tottenham was only just getting to the end of the designing stage. The work had not been let yet, nor had anything been done on it. There was no difficulty as to getting guarantees. They found contractors willing to guarantee water-tight tanks; and the "Ironite" people were quite prepared to guarantee that the purifiers should be gas-tight if they were water-tight, and received two or three coatings of "Ironite." This reduced the experiment to very narrow limits. They would have a water-tight vessel and a gas-tight one. Could they keep it so? Could they keep the purifiers free from temperature cracks? This was a matter of designing and reinforcement. They might—he hoped they would—get a thoroughly satisfactory job, and something that was superior to cast iron. They would have a vessel 50 ft. by 40 ft., free of anything in the nature of brackets, &c.; and they would have five of these, and only five columns under them. This would be due to the monolithic character of the concrete. The floor slab of the vessel was the compression member of the reinforced concrete beams; the boxes were self-supporting, as they were monolithic. It was not like putting concrete on to iron columns, &c. They were obliged to Mr. Johnston for his hint as to continuous concreting, so as to avoid jointing.

The PRESIDENT said he thought it would be difficult to persuade many of the members that, under ordinary circumstances, the building-up of a structure of concrete blocks was preferable to a reinforced concrete structure, which could be made in one piece without the necessity for a great many joints. This was really only common sense. They sometimes forgot, too, that where a box had only to be emptied once in 507 days, it did not pay to put down £700 or £800 worth of machinery to produce a low decimal point cost per ton of oxide handled. Machinery must be worked to pay; it did not pay standing idle.

In proposing a vote of thanks to the authors of the papers, Mr. SAMUEL GLOVER (St. Helens) made some remarks on Mr. Child's paper. These will be found towards the end of our report of the ordinary proceedings [see p. 636].

Brandenburg Association of Gas, Electricity, and Water Engineers.

The thirty-seventh annual meeting of this important German District Association is to be held at the Association of German Engineers in Berlin next Saturday. The proceedings will include an informal discussion, opened by Herr Lempelius, the head of the German Central Gas Publicity Bureau, on War Conditions as affecting Gas, Electricity, and Water Works. The discussion will fall under three heads—viz., (1) Coal Supply, (2) Labour, and (3) the Embargo on Metal. On the following morning members will visit the Museum of the Lighting, Heating, Water, and Allied Industries in the Wilmersdorfer Strasse at Charlottenburg. This Museum has lately been extended, and many fresh interesting exhibits added. On Monday of next week, the members will pay a visit of inspection to the Debenzolizing Plant of the Berlin Corporation gas undertaking at the Gitschinerstrasse works. The Chairman of the Association is Herr Kümmel, of Charlottenburg.

At to-night's meeting of the Institution of Petroleum Technologists—Society of Arts rooms, eight o'clock—after a valedictory address by the President (Sir Boverton Redwood, Bart., D.Sc.), a paper will be read by Dr. J. A. Leo Henderson, upon the "Natural Gas Industry: Its Progress and Importance."

A recent advance of 400 per cent. by German colour manufacturers in the prices of coal-tar colours in neutral countries, is, it is reported, to be followed by another increase of 100 per cent. A desire is manifested to cancel all existing contracts; this being prompted by the fact that quite a large number of dyestuffs can no longer be made by the German firms. There is a great shortage of the requisite raw materials; and those colours which can be produced cost five or six times as much to manufacture as before the war.

COAL CARBONIZATION AND BYE-PRODUCTS.

Middlesbrough Coke-Oven Gas Supply.

The happy position of Middlesbrough in regard to its gas supply, and the economical advantages of bye-product coke-ovens, were freely commented upon at a meeting of the Cleveland Society of Engineers, held at Middlesbrough on Monday of last week. The references were contained in, and prompted by, a lecture on "Fuel Economy from a National Standpoint," by Professor William A. Bone (a native of Cleveland), who pointed to the great waste in bye-products by the old-fashioned bee-hive oven method of carbonization, and suggested that the Government should be pressed to give a reasonable time-limit beyond which no bee-hive installation should be allowed to remain in operation.

Dr. J. E. STEAD referred to the fact that Middlesbrough was in the position to-day that it received no gas direct from coal, but from the bye-product coke-ovens of Messrs. Samuelson and Co. This, he said, was an enormous economy; and he trusted that the example would be followed by many other towns.

Mr. BERRY mentioned a visit to Westphalia twenty years ago, when, he said, coke-ovens were quite as common as they were in England at the present day, and another visit ten years later, "when there was only one bee-hive left, and that was to look at." These coke-ovens, added Mr. Berry, had without doubt stood the Germans in good stead during the present conflict, by reason of the great output of bye-products; and they would continue to do so. England would have been decidedly better off had more attention been long ago paid here to this matter.

Professor BONE, referring to the last normal year of 1913, said that out of the 20 million tons of coal carbonized in this country in that year for hard metallurgical coke, no fewer than 6·5 million tons were treated in bee-hive ovens, involving a dead-loss in the value of bye-products of something like £2,500,000. In face of the fact that all bee-hive ovens had long been abolished in Germany, their continuance in this country was a grave reflection on our industrial economies. Another question which should receive immediate attention was the organization of cheap supplies of gas for manufacturing purposes, which was playing a great part in the promotion of more scientific means of applying and controlling industrial heating operations. The larger users of gaseous fuel would doubtless continue to find it cheaper and better to generate producer gas by the complete gasification of coal and coke on their own premises, than to purchase gas from any public company. But there remained a very large number of industrial consumers whose individual needs of gas were not large enough to warrant the installation of a separate gas-making plant but whose requirements constituted in the aggregate a very large and important demand, which could only be met economically by a public supply company. Some of the large town gas-works situated in industrial areas were taking up the matter with great energy and success. An enlightened policy was apparent; and this had led to the considerable use of coal gas in some of the Sheffield steel-works, chiefly for the hardening, tempering, and annealing of special steels (including tool steels), and for file forging. These were all operations in which accurate temperature control was of vital importance. The rapid development of the bye-product coking-oven, followed immediately by that of the large gas-engine, for dealing with washed blast-furnace gas, had only emphasized the advantages referred to. Proceeding, Professor Bone advocated greater scientific study into the real nature of the complex compounds contained in the coal substance, in order that we should know more of its combustion and distillation.

SCOTTISH JUNIORS AT KILMARNOCK.

Members of the Scottish Junior Gas Association (Western District) visited the Kilmarnock Corporation Gas-Works on Saturday last. A very profitable, as well as enjoyable, afternoon was spent inspecting the new Dempster vertical retorts, and the tar dehydrating and benzol recovery plant. One item of special interest was the apparatus for retinning electrically the gas-stove pans which come back from consumers in a dirty state.

It was explained that the Dempster system of vertical retorts was decided upon after the coal strike about four years ago; and it was selected after due consideration of the position of Kilmarnock, situated as it is on the Ayrshire coalfield, where both low and high grade coal is extensively mined, and where in an emergency very low-grade coal might require to be used. The tar dehydrating plant was installed owing to the fall in the price obtainable for crude tar; and the benzol recovery apparatus was added to complete the equipment. The tar dehydrating plant was intended to prepare the tar to suit the requirements of the Road Board; and as the Board only required tar at certain periods of the year, it was found necessary to instal a large storage tank for crude tar. Since the outbreak of war, however, the Road Board has been economizing; and there is now so little demand for tar that they are forced to sell their current make at a loss.

After going over the works, the party were entertained in the Town Hall. Provost Smith, in welcoming the visitors, said that they were honoured by the visit; and he was glad to think that the Kilmarnock Gas-Works were deemed worthy of a visit. He thought it was good for the members of such an Association to

visit gas-works and enjoy a pleasant and profitable outing; and Kilmarnock should be interesting from the fact that the gas-works were started there almost a hundred years ago. At that time, records show that they paid a Gas Manager £100 per annum, with free house, &c.; but in course of time this sum was reduced to £50 per annum. Then the undertaking was in the hands of a Company, from whom it was taken over by the Corporation 45 years ago. The original gas-works were built on a hill, but the present site of 16 acres were purchased about fifteen years ago, and the new gas-works were opened in 1904. The vertical retorts were not yet out of the makers' hands, as the haulage system was still incomplete. When the Corporation took over the works, the make was some 40 millions, and the price 5s. 10d. per 1000 cubic feet. Now the make is 220 millions, and the price 2s. 8d., which is a war price, and 5d. in excess of what it was. Mr. Fulton suitably replied.

The rest of the evening was spent in harmony. Mr. William Bennett's paper on "Some Notes on Purification" [*ante*, p. 419] was not discussed.

COAL TAR RESEARCH.

Writing in its issue of the 1st inst., "Gas Age" [New York] has the following article:

As we go to press, news comes from Baltimore of the establishment of a laboratory for chemical research in the development of industries which depend for their crude material upon coal tar. This involves the subjects of dyes, drugs, explosives, flavours, wood preservatives, and similar material used in the chemical industry. Since there are probably two thousand of these products, it is quite evident the laboratory will have a large field for investigation. The laboratory is located at Johns Hopkins University, Baltimore; and the very important feature of this investigation is that it is backed by some of our largest gas companies.

The opportunity presented in such an investigation of devising methods and products which can be manufactured from the bye-products of any gas-works is a very important consideration. If the chemists engaged in this work are brought to realize the importance of devising means by which the average gas plant can prepare the crude material without much expense, and make it available for subsequent chemical manipulation, they will be doing a great service to the gas industry; for it is not reasonable to suppose that the ordinary gas tar, with its miscellaneous admixtures, is in a proper condition to be immediately handled by chemical works. The field which this opens up for the utilization of gas tar will not only result in a better price for it, but also in providing the industries of this country with chemicals, many of which have heretofore been imported at great expense.

The gas companies who are backing this enterprise are to be congratulated upon their public spiritedness, as well as upon their foresight in building-up a market for a product which is so little valued as to be used even for firing boilers and laying dust upon macadam roads. The possibilities in the working-up of these tar products can be realized when it is remembered that a large number of factories have been started since the European trouble, and are to-day successfully making the dyes and other chemicals for which we formerly depended upon foreign sources.

As time passes, it becomes more and more evident that the industries of this country must become more or less independent of the rest of the world; and we would suggest to our readers, if they have an opportunity to help along any movement of this kind, that they give it their hearty support.

While upon this subject we might suggest to those manufacturers who are devoting their entire attention to the making of war material, that this war will not last always, and when there are no more war contracts they will have to do something with their plant and employees. It is not too early to consider this exigency; and those who have in the past supplied gas companies with material should take more than ordinary interest in the efforts which tend toward increasing consumption. It is largely through extensions that the products of their works will be needed; and these extensions are naturally forced by increased consumption.

There is also the upward trend of prices to be considered, and means should be devised by which these can be met by economies in manufacture and efficiency in operation. The European war has introduced problems which the farsighted will consider meeting before the need arises.

At the meeting of the "Directors" of the American Gas Institute, held on the 10th ult., the following resolution dealing with the above matter was adopted: "The Directors of the American Gas Institute desire it to go on record as approving the action recently taken by Johns Hopkins University in establishing a course in coal gas bye-product recovery, and the establishment of a suitable experimental plant in connection with this work. The Directors also take this occasion to express their appreciation of the work being done by other Colleges and Universities—such as Michigan, Wisconsin, and Illinois—where courses have been established, and suitable laboratories equipped, for the study of gas engineering. It is the hope of the Directors that other scientific institutions will start similar work; and the Directors assure them of the sincere support and interest of the American Gas Institute."

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Tar Prices.

SIR,—I have for some weeks past noted the serious decrease in the price of tar weekly stated in the "JOURNAL."

It appears to me that the price of tar ought to be of considerably greater value; and that it is in some manner being depressed by the tar distillers.

In justification of this I would point out that I recently wrote our tar distillers, offering to take back from them some portion of our pitch for the purpose of carbonizing it, and thus helping to relieve the situation of the accumulation of pitch at their works, which they keep arguing is the cause of the serious decline in the value of tar.

The result of my correspondence has been that while they assure me they are losing money in paying 20s. 6d. for our tar, they yet inform me that it would not pay them to sell pitch on the basis of Mr. Young's circular, as they would be losers by it; but they would be willing to send me a truck-load of pitch at 21s. per ton net my works.

This certainly gives one the feeling that they are making profit out of their arguments as to accumulation of pitch, and that they do not desire gas managers to ease the situation, because surely, if as they state, the least price they can take for pitch is 21s. per ton, the value of tar is considerably higher than that quoted by the "JOURNAL" this week [March 14].

N. W.

March 15, 1916.

Mortgage Bonds.

SIR,—With regard to the reply by "Accountant" in the last "JOURNAL," I am obliged for the information therein. Do I understand the endorsement referred to should be embossed with a sixpenny stamp irrespective of the amount of the bond, or 6d. per cent. as a "substituted" security?

Another point upon which I am not quite clear is the proviso "that it is executed during the currency of the security." I assume "currency" means any continuity of the same instrument.

Will "Accountant" do me the favour of clearing up these points?

ENQUIRER.

March 16, 1916.

The Terms of Mr. Leech's Appointment at Leeds.

SIR,—I notice in your issue of the 7th inst., a paragraph referring to the discussion which took place at the last meeting of the Leeds City Council, in which it is wrongly stated that I am barred by my agreement from giving expert advice.

It was not until some time after my agreement with the Leeds Corporation was signed that my Committee, knowing that considerable effort would be required on my part to place the Department on a proper footing, suggested that I should not undertake any private work until the reorganization had been completed. The time fixed was for a period of two years from the date of my appointment.

I shall be glad if you will kindly correct the statement referred to in your next issue.

W. B. LEECH, General Manager,
Leeds Corporation Gas Department.

Market Hall, Leeds, March 11, 1916.

[The statement in the "JOURNAL" which is referred to by Mr. Leech, is not literally reproduced in the above letter. In the remark attributed to Mr. Alderman W. Penrose-Green the words "by the agreement" did not appear. We are sorry if the "JOURNAL" paragraph represented that gentleman as saying something which he did not say, and welcome Mr. Leech's explanation, which will remove any possibility of misunderstanding.—ED. J.G.L.]

Naphthalene Troubles at Salford.

SIR,—In your report of my remarks on Mr. Simmonds's paper, on "Naphthalene," you state that in 1914 we had only 172 complaints—quite a phenomenal year—and in 1915 we reduced them to 159. These figures should read "daily" complaints. Will you please correct the same?

The deposit we found left after the elimination of naphthalene by various solvents caused us more trouble than the stoppages due to naphthalene. It contained at least 7 per cent. of prussian blue; a great percentage of oxide of iron; and a condensation in the nature of oil. My object in offering any remarks on the subject was to ascertain if any of the members had similar experience.

R. H. GARLICK, Outdoor Superintendent,
Salford Corporation Gas Department.

Salford, March 14, 1916.

Brentwood Gas Company.—The operations of the Company during the year ended Dec. 31 last resulted in a profit of £4474. After payment of dividends (less income-tax) of 8 per cent. on the original stock and £5 12s. per cent. on the additional stock, there will remain a balance of £924 to be carried forward.

Lichfield Gas Company.—Commenting upon the accounts at the annual meeting of the Lichfield Gas Company, the Chairman (Alderman H. M. Morgan) said coal had cost £2500 more than in the preceding year, which was an enormous increase for a small undertaking. Rates and taxes also were £884 more; and the extra charge of 6d. per 1000 cubic feet for gas had nothing like covered this additional expenditure. Owing to the shortage of labour and the inefficiency of that available, it had been decided to instal machinery in the retort-house. Sixteen out of 26 employees had joined the Colours, and the Manager (Mr. F. Key) and those of the staff who remained had had a very arduous twelve months.

REGISTER OF PATENTS.

Recording Percentage Volumes of Constituent Gases.

CROSWELLER, W. W., of Crumpsall, Manchester.

No. 5041; April 1, 1915.

This invention relates to an instrument which is particularly applicable as a carbon dioxide (CO_2) recorder. The patentee's object has been to design an effective instrument with a minimum of component parts as compared with known instruments for the purpose, thus minimizing the liability to get out of order. The instrument is operated by water head, and a gas-burette is so arranged in relation to the power vessel and a syphon used for draining off water from the power vessel that the burette will always hold a quantity of water which will become stagnant and become charged with any gas which is soluble in water. The power vessel is in direct communication with the gas-burette, without any intervening air-lock, or any controlling mechanism, governing the communication. The exact adjusting of the volume of gas to be measured and the ultimate drainage of the gas sample is effected by a single tube sealed directly by the rising of the water in the power vessel. The three vessels needed therefore are: The power vessel, the gas-burette, and the absorption vessel, apart from a float vessel and float and the usual pen-gear, clock-work drum, and recording chart.

Incandescent Gas-Burners.

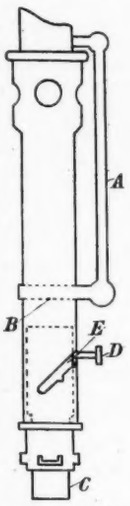
SPARKS, E., of Harringay, N.

No. 2823; Feb. 22, 1915.

To increase the velocity of the mixture of gas and air at the point of delivery in atmospheric gas-burners (of the type in which additional gas is supplied through a bye-pass tube to the burner between the mixing chamber and the burner-head at a distance from the nipple), the patentee proposes to introduce an additional gas supply in the form of a bye-pass, capable of being increased in volume, and which he calls "the reinforced gas supply."

The reinforced gas supply enters the main burner-tube at a point nearer to the delivery nozzle than that at which the original supply enters, and is connected to the main supply through a separate tube at a distance from the nipple. It is controlled by a cock and mixed with the original mixture before being delivered at the nozzle of the burner, and is used as a pilot flame when the main supply is closed—being increased through the separate tube when the main supply is opened.

In the illustration the reinforced gas supply tube A is outside the main burner-supply tube; the outlet of the reinforced supply into the main supply (shown at B) acting as a bye-pass when the burner is extinguished and increased before being delivered at the burner nozzle C, when the main supply is opened. The reinforced supply will be reduced when the main supply is closed-off, and be left burning as a pilot flame at B. The nozzle is shown as an adjustable tube which can be raised or lowered by the pin D; being movable within the slot E.



Sparks' Incandescent Gas-Burner.

Retort Discharging Machines.

SIMMONDS ENGINEERING COMPANY and SIMMONDS, J. J., of Iola, Kansas, U.S.A.

No. 3147; Feb. 26, 1915. Convention date, March 9, 1914.

This invention relates to apparatus for "removing simultaneously from a plurality of furnace retorts the residue remaining after heat treatment of ore therein," by means of a movable main or master carriage and a plurality of plungers actuated by the carriage and adapted to enter the retorts of a furnace—means being provided in the plungers for discharging the retorts simultaneously with the advance of the plungers.

In the preferred embodiment of the invention as disclosed in the specification each clearing element is of the kind which has already been proposed in connection with apparatus for clearing a single gas-retort, and comprises an endless chain movable over sprocket wheels or idlers and adapted to be advanced and retracted—the chain carrying scrapers which progressively remove the residue from the retort simultaneously with the advance of the clearing element into the retort.

Furnaces.

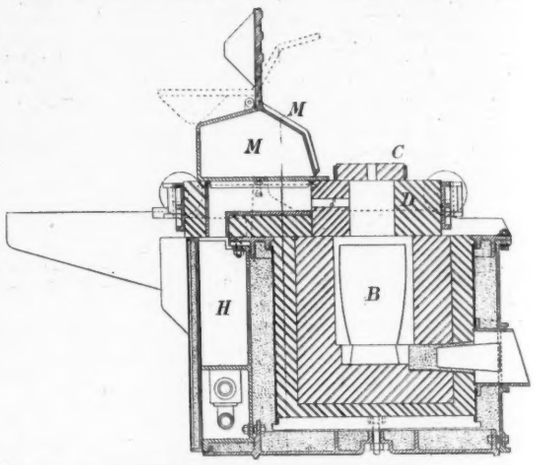
YATES, H. JAMES, of Four Oaks, near Birmingham, and BRAYSHAW, S. N. & E. R., of Hulme, Manchester.

No. 7966; May 29, 1915.

This invention relates to crucible furnaces (with movable covers) for melting metals or alloys. It consists in the particular disposition of the parts of the furnace—comprising a cover fitted with wheels or runners traversing rails affixed to the furnace structure (a flue being provided in the cover above the level of the crucible or pot); a regenerative chamber behind the furnace, to heat the fuel air and gas, with which the flue communicates; and with or without a pre-heating chamber mounted on the movable cover, the bottom of which is heated from the flue.

A longitudinal section of the furnace is given, with the pre-heating chamber.

The furnace to receive the crucible B is built of fire-resisting blocks with an aperture at the top through which the crucible can be introduced or removed. The cover D (also of fire-resisting material) is formed with an opening to give access to the crucible and with a flue to carry away the products of combustion and the waste heated gases at a point above the top of the crucible, so that these pass over it. The aperture is closed by a lid C, which may readily be pushed to one side by hand. A regenerative chamber H is formed at the back of the furnace through which pipes for gas and air pass to heat the gas and air before passing into the burner. The flue in the cover D discharges downwards into the chamber H—a baffle-plate being placed therein to deflect the heated gases downwards and to the outlet, which is controlled by a damper. A pre-heating chamber M may be mounted on



Yates and Brayshaw's Crucible Furnace.

the furnace to receive and pre-heat the ingots of metal before being placed in the crucible. The bottom of the chamber M may form part of, or be in close proximity to, the top of the flue in the cover D, so that it readily receives heat from it. It is provided with a lid, preferably hinged and counter-balanced by a weighted lever, so arranged that the leverage of the weight will vary as the lid is opened or closed, and the lid will be retained in either the open or closed position as desired.

The burner employed may be constructed as described in patents No. 11,117 of 1910 or No. 5931 of 1911, or it may be of any other form for injecting a mixture of gas and air into the furnace.

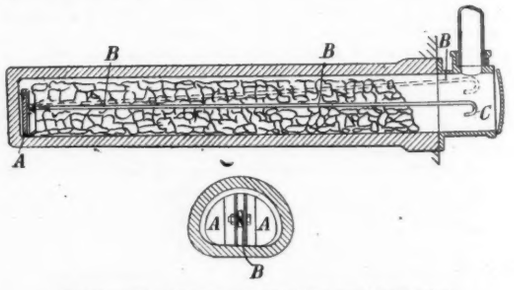
Discharging Retorts.

GIBBONS BROS., LIMITED, of Lower Gornal, Staffs., and MASTERS, E., of Palace Chambers, Westminster.

No. 10,058; July 10, 1915.

This invention has reference to improved means for discharging retorts, and particularly horizontal retorts open only at one end.

Heretofore (the patentees remark) various means have been employed for discharging these retorts. One appliance comprises an iron drawplate which, when placed in the retort, stands up vertically and is pushed up to the back end before charging—the plate being furnished with a draw rod which lies on the bottom of the retort and extends into the mouthpiece at the front end, where it is hooked or is otherwise arranged for connecting to a pulling device so as to withdraw the plate, with the charge in front of it, out of the retort. Heretofore the rod has been made of flat section and laid on the bottom of the retort, where "it has become intensely hot and therefore has soon deteriorated and had to be renewed." According to the present invention, the rod is of round or other solid section, and at one end is jointed or otherwise connected to about the centre of the drawplate, so that it will lie in about the centre of the charge in the retort. Thus it is claimed that the bar will last very much longer in use than the usual flat section draw-bar.



Gibbons and Masters' Retort Discharging Device.

A longitudinal and cross section are given of a horizontal retort with the invention applied to it—showing the charge in the retort with the draw-rod in the middle of the charge. The drawplate is made of about the same shape but smaller than the cross section of the interior of the retort. It has fixed to its front face (and at about the centre of the retort) the draw-rod B, of round section, hooked at its front end C and made somewhat shorter than the internal length of the retort and mouthpiece. It will not thus be subjected to the full heat of the retort until the charge is practically ready to be withdrawn. When charging the retort the bar can be raised "so as to form but a very slight obstruction to the throwing in of the first part of the charge at the back of the retort," and then moved down again to its proper central position until the charging is completed.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:

Bill reported, with amendments: Burnley Corporation Water.

The Imperial Continental Gas Association Bill has been referred to a Committee, to meet to-day.

HOUSE OF COMMONS.

The following further progress has been made with Bills:

Bill read a second time and committed: Tynemouth Corporation.

Bill considered: Aberdeen Corporation Water.

The petitions presented against the Northwich Gas and Plymouth and Stonehouse Gas Bills have been withdrawn.

The following Bills have been referred to a Select Committee, consisting of Sir W. Howell Davies (Chairman), Mr. G. W. Currie, Mr. Hinds, and Mr. Herbert Whiteley—to meet to-morrow: Beighton and District Gas, Folkestone Gas, South Metropolitan Gas, Uxbridge Gas. The Plymouth and Stonehouse Gas Bill was included in this group, but, being unopposed, has since been removed.

The Northwich Gas Bill has been referred to the Committee on Unopposed Bills.

Electric Lighting of Trains.

Mr. ROWLANDS asked the President of the Board of Trade, on Tuesday last week, whether he could state to what extent the substitution of electric lighting for gas lighting had taken place on the railways, and if the change was being made at a satisfactory rate? If not, would the Board of Trade obtain powers to enforce its speedy adoption?

Mr. RUNCIMAN replied that the railway companies generally had made considerable progress in effecting the change, but that the work had necessarily been interfered with owing to shortage of labour and material and other conditions caused by the war.

Aniline Dyes and Oils Imported.

Sir RICHARD COOPER asked the President of the Board of Trade what were the total imports and exports of aniline dyes and oils in Switzerland, Holland, Sweden, and the United Kingdom during the years 1913 and 1915?

Mr. RUNCIMAN stated that no particulars were available for the Netherlands, and no particulars were available for 1915 for any of the countries specified. In 1913, the quantities imported were: 698 tons into Switzerland, 960 tons into Sweden, and 14,151 tons into the United Kingdom. The exports were 7035 tons from Switzerland; *nil* from Sweden; and 2434 tons from the United Kingdom.

LEGAL INTELLIGENCE.

WORKMEN'S COMPENSATION ACTS.

Last Tuesday, the Master of the Rolls, Lord Justice Phillimore, and Mr. Justice Sargant heard an appeal by the respondents in the case of Paulizky *v.* Wandsworth, Wimbledon, and Epsom Gas Company from the award of the County Court Judge sitting at Wandsworth.

Mr. SHAKESPEARE said the County Court Judge, on an application by the workman to review an award of 1d. a week, refused to accede to the employers' request to terminate the payment altogether, on the ground that he had no jurisdiction to do so. The same point had been before the Court of Appeal on several occasions; and it had been held that the County Court Judges had jurisdiction. The Judge found that the workman was not entitled to any increase, as the incapacity was found not to be attributable to the accident. The first award of 1d. per week was made on April 1, 1913, when further payment of compensation ceased; and on May 26, 1915, the workman applied to review the award, and asked for an increase of the weekly payment—alleging that he had not been able to work since the award was made in April, 1913. The Judge found that since the hearing in April applicant had not been incapacitated for work; and that his mental condition was not the result of, or contributed to by, the accident. The Company then asked that the liability to pay 1d. per week should be terminated. Employers, it was contended, had a right to have the question of compensation settled once and for all.

Their LORDSHIPS remitted the case to the County Court Judge to arrive at a decision—expressing the opinion that he had jurisdiction to entertain, and determine, an application to put an end to any further payment.

East Cowes Gas Company.—At the annual meeting of this Company, held at the London office yesterday, it was reported that the sale of gas in 1915, compared with the previous year, increased by 6,725,600 cubic feet, or 25·5 per cent.; and the revenue from residuals by £521. Owing to the phenomenal increase in the cost of coal purchased during the year, the Directors state that they were compelled to raise the price of gas by 5d. per 1000 cubic feet, as from April 1. The additional receipts due to this increased price and to the important increase in the volume of the Company's business only sufficed, however, to meet the extra charges for coal and wages and the enhanced cost of the maintenance and renewal of the works and plant. After charging to the profit and loss account £260 for interest, income-tax, &c., a sum of £2231 remained, and allowed a dividend for the year of 6½ per cent.—absorbing £780, and leaving a balance of £1450 to be carried forward.

MISCELLANEOUS NEWS.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The report of the Directors for the half year ended Dec. 31, which will be submitted at the meeting in Dublin on the 30th inst., states that, after debiting the revenue account with the sums of £4500 and £2174, being capital adjustments in connection with the sale of gas-holder columns and the sale of further wet meters, and making a contribution of £1000 to the officers' superannuation fund, the profit for the half year amounts to £45,239. After providing for interest on debenture stock and temporary loans, there remains a balance of £36,847, to which must be added the sum of £10,663, the balance brought from the last account, and a credit from income-tax account amounting to £4243, making a total of £51,753. The Directors recommend the declaration of the maximum statutory dividend on the consolidated ordinary stock of the Company, at the rate of £5 2s. 6d. per cent. per annum, less income-tax. This will absorb a sum of £39,766, after which a balance of £11,987 will remain to be carried to the next account. In view of the abnormal increases over pre-War times in the cost of coal and freight, the Directors are again very gratified with the results of the half-year's working.

In addition to the two existing vacancies caused by the lamented death of Mr. Richard S. Tresilian, J.P., and the resignation of Alderman Cotton, M.P., two of the Directors (Mr. Francis J. Dickens and Mr. William H. Davies) retire by rotation, and, being eligible, offer themselves for re-election. Mr. Francis M'Bride, one of the Auditors, will go out of office by rotation, and, being eligible, offers himself for re-election.

In the revenue account, the receipts were: Sales of gas (after deducting discounts), £116,204; meter and stove rents, £12,790; residual products, £44,175; and miscellaneous receipts, £3002. The items on the expenditure side were: Manufacture, £90,812; distribution, £21,696; public lamps, £223; rent, rates, and taxes, £5967; management, £7966; and miscellaneous and special charges, £4268. This left a balance of £45,239 to be carried to profit and loss account. The quantity of gas made was 816,301,000 cubic feet, including 309,144,000 cubic feet of carburetted water gas. The quantities sold were: Public lighting, 41,798,000 cubic feet; private lights per meter, 651,880,000 cubic feet; total sold, 693,678,000 cubic feet. The quantity used on the works, &c., was 12,455,000 feet; the total quantity accounted for, 706,133,000 feet; and the quantity not accounted for, 110,168,000 feet. The number of public lights is given at 6258.

MELBOURNE GAS COMPANY.

The Ordinary General Meeting of the Metropolitan of Melbourne Gas Company was held on Jan. 28—Mr. JOHN GRICE (the Chairman) presiding.

The CHAIRMAN, in moving the adoption of the report and balance-sheet, said that during the past twelve months the Company had sold 3012 million cubic feet of gas, compared with 2794 millions for 1914—an increase of 7·8 per cent. The year 1914 indicated an increase of 7·89 per cent. over 1913; so that the past two years showed a steady and consistent rate of progress, though it was not so great as that prior to the difficult period through which they were now passing. On the whole, the Directors thought the shareholders must be more than satisfied that the returns had been so well maintained. On Dec. 31 last, the number of ordinary meters fixed was 119,079, an increase of 4476 for the year, and the number of slots, 26,613, an increase of 711. As the increase in meters fixed was equivalent only to 3·69 per cent., while the increase in consumption was 7·8 per cent., it was probable that the individual consumer was turning more to the use of gas in place of other forms of fuel for domestic purposes. The number of stoves sold during the year was 9189, compared with 11,290 in 1914—the result, no doubt, of fewer houses being erected. The number of stoves on hire had decreased by 1287. Consequently, at the end of last year the Company had 7902 more stoves in use than twelve months earlier. The stoves in use by slot consumers, who now numbered 26,407, increased in 1915 by 2089. Nearly 87 per cent. of the slot consumers were now supplied with cooking-stoves. The use of gas for cooking purposes was increasing in large institutions. In the last three years they had sold no fewer than 34,884 stoves; but the number on rental had decreased by 6432. Of bath heaters they had in the last twelve months disposed of 1237, an increase of 253 over 1914, and of gas-fires 2882 sales had been effected, representing an increase of 713 over the preceding year. That the adoption of gas consuming appliances by the individual consumer was yearly increasing was proved by the fact that the number of gas-fires sold in 1911 was 756, while for 1915, it was 2882—about four times as many. At no other time had coal gas as a fuel for industrial purposes had a greater impetus than now. In the melting of metals, gas, when applied under air pressure, should strongly appeal to the local brass founders. By the introduction of gas-fired furnaces, quite two-thirds of the floor space could be saved; and where three meltings a day were obtained by the old methods, it was possible to get six without lengthening the working day by one hour, or without pushing the men to secure the enhanced output. Brass founders knew to their cost the difficulties and serious delays experienced in the melting of metals by present methods when unfavourable weather conditions prevailed. With gas, these troubles could be overcome. Manufacturers who were at the limit of their resources in workshop accommodation should seriously consider the adoption of gas under air pressure. By its means their output could be practically doubled, thus obviating the need for larger premises and the sinking of further capital in new buildings. For the immediate past half year, sales of gas by meter and under contract amounted to £332,338, as compared with £310,248 for the December half of 1914—an increase of £22,090; while residuals accounted for

£77,848, against £72,678 for the corresponding period of 1914—an increase of £5170. The total revenue for the half year was thus £27,260 in excess of the December half of last year. The balance available for net revenue account was £132,507, as compared with £143,072 in the same period of 1914. The reason for this was to be found by the comparison of the various items of expenditure which, in nearly every instance, showed large increases over 1914. There were higher prices for coal, increases in wages, and an enhancement of the cost of all material required for repairs or use at the works, or for distribution purposes. These heavy increases, especially in freight, cost and carriage of coal and labour, not to speak of taxation, would considerably enhance the expenditure in the coming half year. During the six months about 21 miles of mains had been laid, and 62 miles of services. These figures included about 2½ miles of trunk mains laid in South St. Kilda, Garden Vale, Malvern, and Coburg. The amount written-off this half year for bad and doubtful debts was larger than in recent years, during which the usual figure had been of a very moderate character. The Directors had made contributions to the various patriotic funds out of the profits of the half year, to the amount of £2700. A very substantial percentage of the Company's employees—240 men—had demonstrated their patriotism by enlisting in the Expeditionary Forces. The Company had agreed to make up their military pay to their regular earnings; and this had amounted to £2567 for the half year. One of the employees had gained the distinction of a V.C. The Directors had forwarded to Corporal Issy Smith, the employee in question, a letter of congratulation, together with a cheque for £50. The Directors had hoped to be able to report the trial results of the new installation of Woodall-Duckham vertical retorts just nearing completion at West Melbourne; but this would have to be left to a future meeting.

The motion having been seconded and carried, a dividend of 6s. 6d. per share was declared out of the profits of the half year ended Dec. 31.

SHEFFIELD UNITED GASLIGHT COMPANY.

Increased Consumption in Spite of the War.

The Ordinary General Meeting of the Company was held on Monday of last week—Mr. WILSON MAPPIN, J.P., presiding.

The CHAIRMAN, in moving the adoption of the report and accounts [particulars of which were given on p. 429 of the "JOURNAL" for the 22nd ult.], said the first thing that would strike the proprietors in the accounts was that the capital was overspent at the end of the year by £69,818. In February, 1915, the Directors applied to the Treasury for permission to issue £50,000 of debenture stock. The reply received was that no objection would be raised to them doing so, if they would give an undertaking not to expend any of the money except in connection with the supply of gas to firms working on munitions of war. Under the Company's Acts they were obliged to connect customers whose premises were within a certain distance of the mains; and this being so, it was impossible to give the required guarantee. The Treasury were asked if they had power to relieve the Company of this obligation, and whether they would indemnify them against any action that might be taken on the part of a would-be consumer. Their answer was that they could not alter their previous condition. This attitude struck one as being absurd, and gave one a poor opinion of the capacity of the person or persons who would deal with the matter in such a manner. The money the Treasury refused to allow them to raise economically had had to be obtained from their bankers. While negotiations were proceeding, the Government issued their 4½ per cent. War Loan; and it was therefore useless to continue the controversy, as it was not to be expected that people would take up debenture stock at 4 per cent., when they could have Government security at 4½ per cent. The management of the business during the past year had been beset with many difficulties, not the least being the obtaining of a sufficient number of men to carry on the works. Applications were made to the Labour Exchange, and also to the Ministry of Munitions, who, though they were very prolific with their promises, failed to give any assistance. He would like to mark the appreciation of the Board of the help rendered by a number of the Company's officials, who, with the Engineer (Mr. J. W. Morrison) and several of the Directors, and one or two gentlemen not connected with the Company, volunteered assistance. They assisted in loading-up coal for the retort-houses, and coke into railway-waggons. This was a considerable gain; and it was right that the shareholders should be informed of the good spirit which had actuated the staff. They were employing female labour as far as possible, and had at present about ninety women at the works. The number of men who had joined the Forces was 329. The staff of clerks and meter inspectors had also been diminished from the same cause; and they had replaced them (temporarily, they hoped) by female assistants. The Directors were asked by the High Explosives Committee if they would consent to the erection by the Government of plant for the extraction of toluol and benzol from the gas; and the plant was working satisfactorily. The securities in which the reserve fund was invested had naturally suffered depreciation; and it had therefore been necessary to write-down the investments by a further sum of £13,498. The Directors had effected an insurance on the works under the Government scheme against air-raid risks. It was with the utmost reluctance that the Board found themselves compelled to advance the price of gas in July last by 6d. per 1000 cubic feet. It had always been their aim to supply at the lowest possible figure; and other towns had cast envious eyes on the consumers of Sheffield, who had benefited to the extent of hundreds of thousands of pounds by the careful management of the Company in the past. In addition to war bonuses to the workmen, and allowances to dependants of men who had enlisted, everything that the Company used had cost more. Notwithstanding the curtailment of public lighting, the increase in the quantity of gas sold had been considerable—5·75 per cent. over 1914. This was not surprising, considering the general activity of trade in the city at the present time. In the last four weeks (since the cold weather set in) no less than 60,721,000 cubic feet had been consumed in excess of the corresponding weeks of last year. Coal showed an increased cost of £54,852. This would have been more, but for the fact that the Company had fairly favourable contracts running during the first half of the year, and that there was a considerable quantity in arrear which was not delivered until after June 30. On the other hand, they received £74,801 more for gas, partly accounted for by the increase in price, and partly by the additional quantity sold. The net result was that, whereas in 1914 they were £34,735 short of the amount required to pay the dividend, they were now able, after writing-down the reserve fund investments, and providing for the dividend, to add to the sum carried forward £8713, which would amount to £65,002. The reserve fund stood at the authorized amount of £86,848. There were 1387 extra meters fixed, and 77 additional gas-engines, varying in size from 2 to 550 H.P.—the total being 3583 H.P. The quantity of gas used in engines during the year was 789,630,000 cubic feet. There had been a considerable extension in the use of gas for industrial purposes; the Company having sold furnaces to the value of £9584, with a capacity for the consumption of 96,985 cubic feet of gas per hour. It was with regret that the Company relinquished the maintenance of consumers' burners; but as this was work that could be done by customers individually, they felt that it was their duty to set free the number of young men who were engaged on the work. Though it was too much to hope that all their employees who were on active service would return, the Directors trusted that most of them might again fill their respective places, which were being kept open for them.

The report was adopted; and a resolution was passed declaring a dividend of 5 per cent. on the "A," "B," and "C" stocks for the half year ended Dec. 31.

LEA BRIDGE DISTRICT GAS COMPANY.

Satisfactory Increase in Business.

The Half-Yearly General Meeting of the Company was held last Tuesday, at the Offices, Nos. 63 and 64, Chancery Lane, W.C.—under the presidency of Mr. A. M. PADDON, the Chairman.

The SECRETARY (Mr. Richard Sandell) read the notice convening the meeting; and it was agreed to take as read the report of the Directors and the statement of accounts.

The CHAIRMAN remarked that the report showed a very satisfactory increase in the business, at a time when they were not in a position to expect it; and the dividends had been maintained, in what might be called a precarious period. The capital expenditure in the six months ended Dec. 31 had been £4371; but this sum was only £1659 in excess of the amount written off for depreciation. This reduced sum was well accounted for, having regard to the increase of 12 million cubic feet in the quantity of gas sold. If they allotted to this extension of business £500 of capital per million feet sold, it would represent a sum of £6000 which they could have spent in the half year without altering the very satisfactory ratio of capital expended and gas sold. At the present moment, making allowance for amounts added on conversion, the capital expended was only £605 per million cubic feet, which, for a company of their size, was very good. On the credit side of the revenue account, the receipts for gas were in excess of those of the corresponding period of the previous year by £3233; and this figure was somewhat improved by the fact that public lighting was £203 less. An increase of £104 in rental of meters, indicated that the business was extending healthily as regarded the number of consumers. In respect to residual products, they were able to report an accretion of receipts in every detail. Coke and breeze had brought in £2156 more; tar, £57 more; and ammoniacal liquor and sulphate of ammonia, £690 more. On the other hand, coal, oil, and coke had cost just over £3000 additional—partly, of course, owing to the increased business. With reference to the item of repairs and maintenance, there had been spent on works and plant an amount equivalent to 6·39d. per 1000 cubic feet of gas sold; on mains and services, 1·8d.; on meters, nearly 2d.; and on gas stoves and fittings, more than 5d. These figures in the aggregate amounted to close upon 1s. 3½d. per 1000 cubic feet; so that, whatever the results in the accounts might be, it would be seen that the Board had the situation well in hand. Insurance was £361 more, owing to provision having been made in regard to possible damage by air-craft. Payments to dependants and war bonuses had increased by about £350. The profit and loss account showed that, whereas they brought in £5885, they were taking forward £5808, or only £77 less. On this occasion, no contribution was being made from revenue to the reserve fund; but six months ago a sum of £644 was transferred. The benefit fund had been credited from revenue with £186; but there had only been disbursed £164, and there was £314 invested by deposit in the bank. It was advisable to have a fund of respectable proportions, in view of uncertainty as to the future. The balance-sheet was very satisfactory. There was cash at the bank, in hand, and on deposit amounting to £10,000, which was a very gratifying entry at times like the present. Now as to the future. The ground in front was more difficult than that which had been already traversed. They could not expect to do quite so well during the next six months as they had during the past, because the burdens would be greater; but there were no very exceptional difficulties to deal with in the Company. Getting their coal by rail, as they did, the Directors did not think the supplies would be seriously disturbed. Like everyone else, they were experiencing difficulty in getting exactly what they required; but they believed the Government would see that they had it in the long run. One effect of this great war had been to show, to the Government primarily, and to the public in the second place, how vastly valuable the gas undertakings were to the country at large. In a vague sort of way, this was beginning to be grasped, though its full extent was not yet realized. The first great value of the gas industry to the country was that it provided for the most economical use of fuel. It used all the coal up, and wasted none. This was a national factor of inestimable value. He concluded by moving the adoption of the report and accounts.

Mr. G. W. CAREY seconded the resolution, which was agreed to.

On the proposition of the CHAIRMAN, seconded by Mr. A. F. PHILLIPS, dividends were declared (less income-tax) at the rate of 5 per

cent. per annum on the preference stock and 6½ per cent. per annum on the consolidated ordinary stock.

The retiring Director (Mr. J. M. Miles) was re-elected, on the motion of the CHAIRMAN, seconded by Mr. PHILLIPS; and the retiring Auditor (Mr. James Randall) was also re-appointed.

The CHAIRMAN, in proposing a hearty vote of thanks to the officers and their staffs, remarked that the figures he had quoted showed to what an extent such a vote was justified. Mr. Cross, especially, had had to effectuate an important change in the technical outfit on the works; and his difficulties must have been very great. He had struggled successfully with them, and the Directors owed a great deal to him. They had also had loyal co-operation from Mr. Sandell.

Mr. E. L. BURTON seconded the vote, which was cordially passed.

Mr. CROSS, in the course of his acknowledgment, said that, having completed twenty years in the service of the Company, a few comparisons might be of interest to the proprietors. In 1895—the year previous to his coming to Lea Bridge—the make of gas was 87 million cubic feet; whereas last year it was 505 millions. At the earlier date there were no prepayment consumers; but the ordinary consumers numbered 1350. The total at the present moment, including slots, was 23,723. There were 225 cookers in 1895; now they totalled 18,187. He hoped that in another twenty years he might be able to give them some better figures still.

A vote of thanks to the Chairman and Directors brought the proceedings to a close.

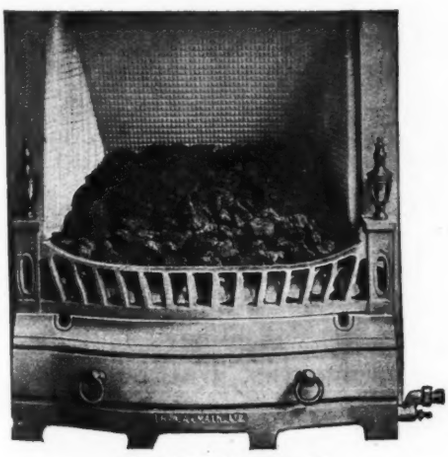
JOHN WRIGHT AND EAGLE RANGE.

The Annual Meeting of the Company took place in Birmingham, last Tuesday—Mr. H. JAMES YATES presiding. The report was adopted, which was noticed in the "JOURNAL" for the 7th inst. [p. 554.]

The CHAIRMAN, after referring to the war and the commercial interests of the nation, went on to deal with the Company's business. He said that, in addition to the fact that a great proportion of their output to-day is for actual war work and appliances for use in military camps and hospitals, all gas-consuming apparatus, of which the Company were the largest makers, had a peculiarly great value at the present time with relation to the manufacture of munitions. This being so, the Ministry of Munitions some months ago issued a circular to all the munition factories in the country urging them to use gas appliances for every possible process in munition manufacture. But notwithstanding this official pronouncement, and the obviously vital relation that it established between gas output and that of munitions, in various official quarters the importance of this aspect of things was very far from being realized. It would be unspeakably unfortunate if military officials, or if the Tribunals generally, were to act upon the view that, because gas manufacture was one remove away from actual munition manufacture, it should be treated as a negligible factor, and businesses like their own be allowed to lose indispensable employees, either by their being taken for military purposes, or being permitted by Munitions Tribunals to give up their present employment. The Company were now contributing to the support of over 600 dependants of employees who had left to serve the country. For years past, he had been able at the Company's annual meeting to report that the year under review had been a record one, both for turnover and profit; but on this occasion he was not in such a fortunate position, though, had they been able to find sufficient men and material, and to get these at anything like normal cost, the turnover would have greatly exceeded that of any previous year, and the profits would have shown a proportionate advance. They had had the orders, but had not been able to deal with them. The adverse effect of the war conditions upon the profits had been most marked in the gas-stove section of the business. Fortunately, however, during the past year they had been reaping a very greatly increased benefit from their subsidiary businesses, and also from the industrial apparatus or furnace department, which had during 1915 grown in a manner beyond anything that they could have hoped to attain. This he attributed to the policy they originated in the gas-stove trade a number of years ago, of spending thousands of pounds annually in research and experimental work. In respect of the range of industrial apparatus manufactured in their Essex Works and by the Brayshaw Furnaces and Tools, Limited, they held to-day a position of unassailable strength. Their cash position continued to be extremely satisfactory. As a result of having disposed of their unissued shares in purchasing various businesses, they had now practically no more share capital available; and at the present time they had before them the possibility of further similar arrangements. They therefore thought that this was an opportune moment to ask for powers to increase the share capital; and it had been felt that, while they were doing this, it was desirable to make the increase a large one, so that there might be sufficient shares available to meet any further contingencies which might arise. There was a large sum employed in the business which was not represented by shares; and in asking the shareholders to sanction the increase of the share capital, the Directors had, after careful consideration, decided that if the Treasury should prove willing to give their consent, the Company should capitalize some of the money which was now represented in the business by reserves. These must not be taken as being in any sense bonus shares, as the object was to bring the amount of the issued share capital more closely into line with the capital which was actually employed in the business, and without which the present profits could not be earned. The suggestion was to issue three additional ordinary shares for every five shares held to-day. This arrangement would bring the rate of dividend down to the very reasonable figure of 12½ per cent.; and assuming that the profits were maintained, these eight shares would continue to bring to present holders of five shares precisely the same income as they had hitherto received.

The report was adopted; a dividend of 2s. 6d. per share, free of income-tax, was declared on the ordinary shares; and at a subsequent meeting it was unanimously agreed to increase the share capital of the Company from £300,000 to £750,000.

THE MAIN GAS FIRES.



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METROPOLITAN COUNCILS AND THE GAS SUPPLY.

The Suggestion of the Ministry of Munitions.

At the Meeting of the Lambeth Borough Council last Thursday, the Lighting Committee reported having had under consideration communications from the Ministry of Munitions, forwarding notices which have been issued to gas companies requiring the extraction of certain constituents needed for the manufacture of explosives, and suggesting, in these circumstances, that the Council should do everything in their power to prevent attacks being made on the gas undertakings, owing to any possible deterioration in the quality of the gas supplied, either by ceasing to test the gas altogether, or, at any rate, by preventing the result of the tests from being made public. The Committee instructed the Clerk to communicate with the London County Council, inquiring whether they would continue to test the gas and issue reports of such tests, to which a reply had been received that the Council had decided to suspend, for the present, the publication of the results of the usual daily tests of gas supplied; otherwise the ordinary procedure would be continued.

"The County Council also stated," the Committee's report continued, "that they were naturally anxious not to take any action which might in any way appear to interfere with the due prosecution of the measures deemed to be necessary to meet the national requirements. The possible deterioration in the quality of the gas raises, however, the important question as to the relation which exists between the shareholders and the consumers under the sliding-scale conditions governing price and dividend. The County Council are of opinion, and in the past have successfully contended, that any saving due to the manufacture of a lower quality gas should enure entirely to the benefit of the consumer. In the present case, it would consequently follow that the whole value of the products extracted from the gas in excess of those necessary to maintain the gas at its standard quality should be similarly applied. The question whether any definite action had been taken in this direction would, however, require careful consideration; and, while unwilling to suggest that there should be any forfeiture in respect of deficiencies, the County Council felt that it may hereafter be found necessary to require the companies to give some compensating advantage to the consumers. The position would consequently be reviewed after a period of about three months, when further information would be available as to the actual results of the action taken.

"On Jan. 20, a communication was received from the Town Clerk of Kensington, stating that his Council are assured that gas companies can, in a very great measure, by a process of artificial enrichment, make good any loss of illuminating and calorific power occasioned by the withdrawal from their gas of the constituents which the Government are requiring; and in these circumstances they do not agree with the suggestion put forward by the Ministry of Munitions, and have urged that the testing of gas by the County Council shall continue as heretofore. In reply to our request that the Kensington Council would furnish us with any data upon which the Lambeth Borough Council could take action along the lines suggested, a letter has been received stating that such data were of a confidential character, and could not be furnished as desired. It was also stated that it is generally admitted that the gas companies have found it necessary from time to time artificially to enrich their gas, particularly water gas, in order to bring it up to the standards of illuminating and calorific power in force under normal conditions; and that it might reasonably be contended that such 'enrichment' should be resorted to in a greater measure, so as to make up for the reduction in quality brought about by the extraction of the constituents required by the Minister of Munitions. The Kensington Council, however, did not go so far as to put forward the above contention; but they considered that gas consumers were entitled to know the quality of the gas supplied to them, even if the quality be lower than the usual standard. It was felt that the publication of the lists by the London County Council would, to some extent, ensure the quality of the gas being kept up to the reasonable standard."

Having regard to all the facts, the Committee stated that they had come to the conclusion that the Council should support the action which has been taken by the Kensington Borough Council; and they recommended accordingly. This was approved of.

Farnham Trench Fatality.

An action has recently been tried at the Surrey Assizes which arose out of a fatal accident at Farnham last June. Albert Masters, a drayman employed by Messrs. Watney, Combe, Reid, and Co., was returning home from a round late one night with his van, when, for some reason or other, both horse and man fell into a trench excavation made by the Farnham Gas and Electricity Company, in connection with gas-main laying operations. The connection between the new and the old mains was broken, the gas became ignited, and the man was burned to death. The horse, also, was so injured that it had to be killed. Mrs. Masters sought to recover damages for the loss of her son, who was, she said, her sole means of support; and the brewers, too, claimed damages. The facts of the case were fully gone into at the inquest, which was reported in the "JOURNAL" for June 22 [p. 710]. Mr. Elliott, K.C., urged that the barrier was improperly placed and insecurely fixed, and that the lighting of the spot was insufficient. Mr. Dickens, K.C., for the Company, said deceased, after nearly eighteen hours' work, must have been dozing, or not looking out. Deceased knew the trench was there, as he had passed it every day for a month. Witnesses were heard; and the Special Jury found the Company had not been negligent, and that deceased had been guilty of contributory negligence. Mr. Justice Bray therefore entered judgment for the Company in both actions.

A Belfast Coroner's Jury returned a verdict of "Accidental death" in the case of James Webb, aged 77, who was found in an unconscious condition in his bed-room; a gas-jet being turned on fully.

After the War.

¶ It is anticipated by economists that industrial and other conditions consequent upon Peace will impose as severe a strain on commercial adaptability as those developed by the continuance of War.

¶ In our own case, we believe that the intricate difficulties of labour, material, organization, and transport, which have had to be surmounted during the past twelve months, will be seen to have made for INCREASED STRENGTH, and that our technical facilities will prove fully equal to whatever demand may then be made upon them.

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GOVERNMENT TRIBUTES TO SOUTHPORT GAS OFFICIALS.

At a special meeting of the Southport Gas Committee last week, the Chairman (Mr. Richardson) reported the receipt by him of the following letter from the Department of Explosives Supplies of the Ministry of Munitions of War:—

> Sir,—I am directed by the Minister of Munitions to express the hope that your Committee will be able to grant the release from its employment of Mr. Whitehead, Assistant Engineer, to the service of this department. His work will be entirely connected with gas-works, from which it is hoped to increase still further the present production of the raw materials for explosives purposes. In view, therefore, of the urgent national requirements for these at present, it is hoped that your Committee will be able to consent to his release at the earliest date possible.
>
> I am to take this opportunity of referring to the very valuable assistance which this Department has been receiving from your Engineer, Mr. Bond, and to thank you again for having enabled him to devote so much time and attention on its behalf.
>
> (Signed) F. L. HALFORD.

The Committee at once gave their consent, and Mr. Whitehead (who is a native of Birmingham, and recently took his B.Sc.) left Southport for London. His duties at Southport have been those of draughtsman and chemist; but since the war commenced, a good deal of experimental work has been carried out, and it is in connection with this that Mr. Whitehead's services are now required by the Government. The tribute to Mr. John Bond is well deserved. He is a member of Lord Moulton's Committee, and in this capacity has been visiting various works giving instructions.

The Dublin Public Lighting Committee, in their estimate for the coming year, remarked that one of the difficulties to be faced is the fact that the price of glasses has gone up from 39s. to 114s. a gross.

The Davis Gas-Stove Company forward photographs of some of a series of artistic and concisely worded advertising cards which are being displayed in the windows of their Oxford Street exhibition salons. As a series, the cards deal comprehensively with the purposes of the salons, to visit which they furnish a cordial invitation; and it is not surprising to learn that many visitors are being attracted by them. One notices in them the following, among other, interesting questions: "Would you like to see the kitchen-range supplied to H.M. the King?" "Would the fire-grates adopted by Royalty and Cabinet Ministers interest you?" The answer is: "If so, inspect the exhibits in the salons within."

NOTES FROM SCOTLAND.

Great Reduction in Edinburgh and Leith Public Lighting.—The greatly reduced consumption of gas for public lighting purposes in Edinburgh and Leith has already been referred to in these columns; and it was made strikingly manifest by the Engineer (Mr. Alexander Masterton) in some figures he submitted to the meeting of the Commissioners on Monday of last week. For the year 1913-14 the consumption was nearly 81 million cubic feet, value £9098; in 1914-15 it fell to 61 millions, value £6837; and in 1915-16 to 10 millions, value £1155. The Commissioners decided that the current rate charged to private consumers—3s. 4d. per 1000 cubic feet, with rebates according to a graduated scale of consumption—should apply also to the Corporations of Edinburgh and Leith for gas to be used by the street lamps during the ensuing year. The "Edinburgh Evening Dispatch" points the moral of this lighting economy by remarking: "Though the unwonted darkness in the city has been the cause of no small inconvenience and some annoyance to many people in Edinburgh, the gloomy cloud still has its silver lining. Before the war started, we were in the habit of paying over £9000 for the gas consumed in public lighting. Last year the cost was only £1155. Here is a saving of about £8000, or two-thirds of a penny in the pound on the rates. Our very trials may yet prove an education in economy." It is doubtful whether the lighting of the streets will be carried out after the war on quite so liberal a scale as that which obtained in pre-war days; for, at a meeting of the Cleaning and Lighting Committee of the Edinburgh Town Council, held the same day, the Lighting Inspector was instructed to report as to how many gas-lamps could be dispensed with, and what reduction might be made in the illuminating power of the electric lamps.

Female Workers in the Glasgow Gas Department.—As an example of the extent to which the gas industry is, where practicable, utilizing female labour to replace men who are needed for the Forces, the case of the Glasgow Gas Department may be cited. Here, out of 700 odd employees who have joined the Colours, nearly 100 were meter inspectors and clerks. To take the places of these men, 90 women are now employed in the department, of whom 57 are meter inspectors. In the "JOURNAL" last week, it was stated that, before the Exemption Tribunal in Glasgow, an employee of the Corporation who appealed said he had a badge and certificate from the Ministry of Munitions, and was chief clerk and meter inspector in the Gas Department. As a matter of fact, the man referred to was an employee of a neighbouring corporation. The statement which appeared last week, that there are "a lot of women doing work as meter inspectors in Glasgow, and they are doing it very well," we are now able to supplement by the figures quoted above. The women have, it seems, been at work for several months, and are giving every satisfaction.

Big Demand for Gas in Glasgow.—There has recently been experienced a great increase in the demand for gas within the area supplied by the Glasgow Corporation Gas Department. In addition to the large quantity now being used in engineering works busy on

"BEARSCOT" SPECIALITIES

Telegrams: "Scrubber, Manchester."

"Have never failed to give Satisfaction."

R. & J. DEMPSTER, Ltd., MANCHESTER.

London Office: 165, GRESHAM HOUSE, Old Broad St., E.C.

Government contracts, it is said that the consumption has lately been increased through the high price and shortage of coal having induced householders to use gas-fires. Having had before them a report as to the stocks of coal at the various gas-works, the Gas Committee remitted to certain members, with the Engineer and General Manager (Mr. Alex. Wilson), to take such steps as they might deem necessary in the circumstances, in order to obtain adequate supplies of coal.

Perth Gas Workers' Wages.—There was some discussion in the Perth Town Council last week on the award of Sheriff Mackenzie, giving the Corporation gas workers an advance in their wages. There was a recommendation of the Gas Committee that the increase granted by the award should apply also to the hot-coke wheelers and others mentioned as excepted, and that the Council discontinue the privileges which are at present granted to the men outside of their wages. When the matter came up for consideration, Lord Provost Scott stated that the award of the Arbitrator was not yet completed. He made very palpable mistakes; and they had called the attention of the Board of Trade to these. In the circumstances, he had to ask the Council to postpone consideration of the question until the corrected award was in their hands. This suggestion was ultimately adopted.

An Edinburgh Gas Explosion Claim.—An action, in which £500 damages are claimed, has been brought against the Edinburgh and Leith Gas Commissioners by Miss Violet Waddell, of Edinburgh, who states that, on the evening of Dec. 10, she was conversing with her aunt on the pavement when a violent explosion took place in a house on the opposite side of the street. She was struck in the face by broken glass, and a basin was hurled against her. She alleges that her sight has been seriously injured, and that she has suffered from shock. In her statement of claim, she imputes fault to the defendants, in respect that they knew that there was an escape of gas in the house in question, and culpably neglected to remedy the defect. The defendants deny fault, state that claimant has exaggerated her injuries, that the condition of her eyesight has not been caused or aggravated by the accident, that they are not responsible for the maintenance or repair of internal pipes and fittings beyond the meter, that there was no defect in the pipe-connections between the main and the meter, and that the workman who temporarily stopped the leakage with white lead did so without the authority of the Commissioners.

Charge of Stealing Gas.—Robert Murray, an old man of 69, a plumber by trade, was charged in the Edinburgh City Police Court on Tuesday last with stealing from the Commissioners 3000 cubic feet of gas. The meter had been removed from his house some months ago; but on the 10th ult. one of the Commissioners' inspectors noticed that a piece of rubber-tube had been attached to the service pipe, which entered the accused's house through the top of the kitchen window. On making investigation, the inspector found that the tube supplied gas to a jet, a griller, and a hot-plate. It was stated in defence that gas was escaping from the pipe; and that Murray, rather than it should be wasted in the open air, thought he would put it to practical use. The argument, however, made no impression on the Magistrate, who sentenced the ingenious plumber to twenty days' imprisonment.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *March* 20.

The London tar products position is unchanged. Notwithstanding freight difficulties, shipments of pitch are made from time to time. The makers' export price for this article remains at 19s. to 19s. 6d. net per ton f.o.b. at works. Values generally are unaltered.

Sulphate of ammonia is still held-up from export owing to the absence of licences, although it is quite clear that more sulphate is being reserved in the United Kingdom than the country needs. The price is nominally unchanged for export—a special price ruling for home agricultural purposes.

Tar Products in the Provinces.

March 20.

There is nothing fresh to report concerning the markets for tar products. Pitch remains unchanged. Slight business is being done in creosote. There has been a little inquiry for solvent naphtha during the past week; but the prices quoted are quite reasonable. Heavy naphtha is in fair demand.

The average values of gas-works products during the past week were: Gas-works coal tar, 16s. to 20s. Pitch, East Coast, 15s. to 15s. 6d. per ton; West Coast, 14s. to 14s. 6d. Manchester; 15s. to 15s. 6d. Liverpool; 17s. to 17s. 6d. Clyde. Benzol, 90 per cent., London, 1s.; North, 10½d. to 11½d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 7d. Solvent naphtha, naked, North, 2s. Heavy naphtha, naked, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 2½d. to 2⅝d. Heavy oils, in bulk, 3⅝d. to 4d. Carbolic acid, 60 per cent., East and West Coasts, 3s. 4d. naked. Naphthalene, £18 to £28; salts, 80s., bags included. Anthracene, "A" quality 2d. to 2½d. per unit; "B" quality, nominally ¾d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *March* 18.

A fair demand has been experienced from one or two quarters, but prohibition has still stood largely in the way of business. Consequently, there has been no change in the position of this material throughout the week, and quotations have remained at £16 17s. 6d. per ton f.o.b. Hull, £17 f.o.b. Liverpool, and £17 2s. 6d. f.o.b. Leith for early shipment. For future delivery little interest has been shown, and no transactions have been reported.

Nitrate of Soda.

The market for this article has continued very firm, and holders

The "Acmefont" Gas-Heated Boiler.

The "Acmefont" is specially suitable for warming Cubicle Buildings used for Sleeping Accommodation, Sick Bays, Changing Clothes, &c. The heating of each hut is under separate control, and this system of heating possesses advantages in

WORKING,
FIRST COST, and
MAINTENANCE

which a centrally-fired system cannot offer.

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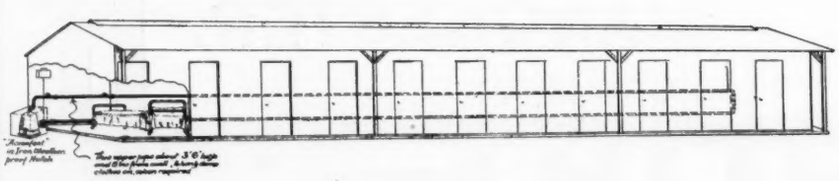

ARDEN HILL & CO.,
Acme Works,
BIRMINGHAM.

now require 17s. 3d. per cwt. for ordinary quality, and 18s. for refined, on spot.

Sulphate of Ammonia.

From another source it is stated that to-day's values of this article are as follows: Outside London makes, £15 17s. 6d. to £16; Hull, £16 12s. 6d.; Liverpool, £16 15s.; Leith, £16 17s. 6d.; Middlesbrough, £16 15s.

COAL TRADE REPORT.

Northern Coal Trade.

The uncertainty of the supplies of coal affects the Northern coal trade rather unequally as between the steam coal and gas coal branches. In the steam coal trade, there is a good demand, and tonnage seems relatively more plentiful. Best Northumbrian steams are from 32s. 6d. to 34s. per ton f.o.b.; and for second-class steams, the current quotation is from 28s. 6d. to 30s. per ton. Steam smalls are generally firm—the various classes being from 15s. to 18s. 6d., so that smalls are at good prices, which may be stiffened as the exporting season grows nearer. Much, however, as to the actual price paid for cargoes depends on the possibility of prompt or early shipment; for the output is fair, and the question of ready loading is one of the chief factors. In the gas coal trade, the subject of early shipment is also prominent—more so perhaps because freights are higher in the foreign than in the coasting trade. In gas coal, best Durhams are about 25s. 6d. per ton f.o.b.; second class gas coals are about 24s. per ton; and "Wear Specials" are 27s. per ton f.o.b. It is possible that, in a few instances, these quotations may be discounted a little when steamers can be offered for prompt loading. There are several substantial contracts for gas coal in the market; but the details are not yet known, though it is probable that the legal addition to former contract prices will largely decide the actual figures to be paid. Freight quotations for gas coal seem based now on about 15s. from the Tyne to the Thames; while to some of the Mediterranean ports, there are freights quoted that are relatively much higher than these, and seem likely to continue. The difficulty, therefore, as to fixing ahead is found greatly to affect forward sales even at the high delivered values that now prevail. Coke is steady with full exports. Gas coke does not show much change; and the quotation for good makes is 27s. 6d. to 29s. per ton f.o.b. Tyne.

The report to be submitted at the annual meeting of the Davis Gas-Stove Company on Friday states that the net profits for the year ended Dec. 31 amount to £15,490; and adding the sum of £7703 brought forward, makes a total divisible profit of £23,193. It is proposed to pay a dividend on the ordinary shares for the half year at the rate of 15 per cent. per annum, making (with the interim dividend at the rate of 5 per cent. per annum) 10 per cent. for the year, less income-tax; to contribute £3000 to the provident fund; and to carry forward (after providing for the proportion of profits payable to the Directors) £10,817.

Plymouth Gas Bill Unopposed.—The Bill of the Plymouth and Stonehouse Gas Company, which was to have come this week before a House of Commons Committee, will, all the opposition having now been withdrawn, in due course be referred to the Select Committee on Unopposed Bills.

Dublin Electric Light Failure.—On two occasions last week, the Corporation electric lighting current in the Glasnevin and other northern suburbs of Dublin failed early in the evening, with the result that streets, business establishments, and private residences were left in darkness for considerable periods. Much annoyance and inconvenience arose. The City Electrical Engineer stated that the breakdown was due to "something having gone wrong with a fuse."

Higher Prices at Bourne.—At the last meeting of the Bourne Urban District Council, a report of the Gas Committee was adopted recommending that the price for gas be increased to 4s. 7d. per 1000 cubic feet to private consumers, 4s. 10d. for slot-meters without cookers, and 5s. 1d. for slot-meters with cookers. It was pointed out that prepayment meter consumers using cookers had to burn 13,000 cubic feet of gas per annum to make their prices equal to those of ordinary consumers.

Mishap at the York Gas-Works.—In last Wednesday's issue, the "Yorkshire Post" stated that on the previous evening "the city of York was thrown into partial darkness so far as householders who rely on gas lighting were concerned. It seems that in the morning a small explosion occurred in the water-gas plant. The explosion, slight in itself, damaged a pipe, the repairs to which occupied till 7 o'clock in the evening, during which time the plant was idle. The accident was particularly unfortunate, owing to the fact that there was a comparatively small amount of gas in stock at the time; and when the demand on the stock had been in operation for about an hour, it almost entirely gave out. The supply improved later in the evening."

The Leiston Gas Dispute.—The Directors' report, which was unanimously adopted at the meeting of the Leiston Gas Company, stated that the results compared favourably with former years, notwithstanding the continued restrictions on lighting. No increase in the price of gas had been made, though much higher prices were being paid for coal and other materials, and the markets were still on the upgrade. A regrettable difference of opinion had arisen with the Urban District Council owing to the street lighting having been prohibited by the military authorities early in the year. The Company offered to make a reasonable allowance; but the Council refused to consider it, or to make any counter proposal, and, in fact, declined to pay anything at all. The Company were, therefore, reluctantly compelled to take legal action; and judgment was given in their favour, with costs. The Council were appealing against this judgment. Pending the final decision, a considerable sum, and also an amount to meet possible costs, had been carried to reserve in the accounts; and the Directors had decided to reduce the dividend, which had in the past two years been paid at the rate of 5 per cent. per annum, to 4 per cent.

Richmond's Bungalow Cookers

SUPPLIED in four sizes, Richmond's 'Bungalow' Cookers contain many special features of great practical utility. The Oven raised to prevent stooping; the hygienic advantage of the raised stand avoiding collection of dirt beneath cooker; the convenient hotplate with patent griller of increased efficiency, and the rack (Patent No. 4975/1914) holding plates in vertical position, are all features which strongly appeal. Right hand illustration shows the new size 'Bungalow' No. 3.

The RICHMOND
Gas Stove & Meter Co., Ld.,
London and Warrington.

Woking District Gas Company.

Reporting to the shareholders on the working of the past half year, the Directors of the Company stated that the sales of gas showed a decrease of 6·19 per cent. over the corresponding period of 1914, principally owing to the extinction of nearly all the public lamps. The receipts from residual products, however, increased by £186. The revenue for the half year was £11,231, and the expenses on revenue account £9079, leaving a net profit of £2152 to be carried to profit and loss account, to which must be added the balance brought forward from the last account (£2168). After charging £287 interest on debentures and loans, there remained an available balance of £4032. The Directors recommended the payment of dividends on the preference stock at the rate of 5 per cent. per annum, and on the "A" and "B" ordinary stocks at the rate of 5½ per cent. per annum, which would absorb £1739, leaving the sum of £2293 to be carried forward. In accordance with the authority given to the Directors at a special general meeting, they offered privately for subscription £10,000 of 6 per cent. redeemable debenture stock; and the whole of this stock has been taken up at par. The money was required in order to pay off the loan from the bankers, as well as to pay for the carburetted water-gas plant recently erected, and to provide working capital.

Ilford Gas Company.

In the course of his remarks to the proprietors at the recent half-yearly meeting of the Company, Mr. William Ashmole, the Chairman, said he was sure the results shown in the balance-sheet would be regarded as highly satisfactory. The general business in the six months ended Dec. 31 had been well maintained; the sale of gas showing a decrease of only 0·07 per cent., when compared with the corresponding period of the previous year. The district being almost purely residential, the loss of consumption caused by the lighting order had not been counterbalanced by extra output for factories. Variations in the quality of coal they had had to buy to take the place of contract supplies which could not be procured, had not only affected the make of gas per ton, but had also caused considerable clinker trouble in the furnaces, and in the water-gas producers. The balance of profit and loss account available for dividend was £25,897. There was a reduction in the amount shown, under co-partnership, brought about principally through the sliding-scale—the rise in the price of gas automatically bringing down the bonus paid to the co-partners. The war bonus at present being paid was 5s. per week to every man over eighteen years of age, and 2s. 6d. to every boy under it. The staff received 5 per cent. war bonus on their salaries; this being paid to everyone whose salary did not exceed £150 per annum. The revenue from the sale of gas was considerably more, owing to an advance of 4d. per 1000 cubic feet. The report was adopted, and dividends were agreed to for the half year (less income-tax) at the rate of £7 7s. 6d. per cent. per annum on the ordinary "A" and "C" stocks, and £5 17s. 6d. per cent. per annum on the ordinary "B" stock.

Comparison of Hastings Gas and Electricity Undertakings.

Referring to the position of the electricity undertaking, as indicated in the "JOURNAL" last week, the Hastings "Evening Argus" says: "Of course, one of our millstones is the electricity undertaking. We fancy that the most rabid advocates of municipal trading will now, like the opponents of national service, have changed their opinion through the war, and be inclined to admit that the lonely furrow we ploughed for some time in supporting the gas enterprise was far-sighted. Ratepayers have now the two reports before them. They have a loss on the rate-supported electricity undertaking, a profit on the privately owned Gas Company! The prospect of a further loss on the rate-owned electricity undertaking; a dividend this half year, and the prospect of a dividend, on the privately owned gas undertaking! A substantial deficit on the ratepayers' concern; a substantial profit balance on the private enterprise! Charge to the ratepayers of several hundred pounds on their own business, 'to have darkness instead of light;' a saving on the gas bills, to have darkness instead of light! The rate-supported electricity undertaking cannot render any national service; the privately owned gas undertaking can and does! As the difficulties of freightage, and increased cost of materials, and lower consumption continue, the burden of the ratepayers for their own Corporation industry must increase; whatever effects from these causes are felt by the privately owned Gas Company the ratepayers will not suffer. Yet with this lesson before us, we have added yet another large rate-supported enterprise to the speculations we shall have to worry about as the months go on. One would have thought the folly of municipal trading had been among the follies we have been only too glad to cast away when confronted by the stern realities of war conditions."

An Agreement in the South Wales Coalfield.—On the conclusion last Thursday of a conference between Sir George Askwith and the representatives of the South Wales Coalowners' and Miners' Federation, on the question of the non-union difficulty, it was announced that a tentative agreement had been arrived at. This, it is understood, establishes machinery whereby no man working in the coalfield will be allowed to continue unless he holds a union card, thus rendering impossible strikes on the non-union question. The proposed agreement is for the duration of the war only.

Yorktown and Blackwater Gas Company.—The business of the Company shows satisfactory progress; the increase in the quantity of gas sold during the year 1915 being over 7 per cent., while the make for the first time in the history of the Company exceeded 100,000,000 cubic feet. The exact figure is 103,242,500 cubic feet, or 6,594,700 cubic feet more than in 1914. The total receipts on revenue account amounted to £22,532, as compared with £18,655; the gross expenditure being £17,554, against £14,909. The balance carried forward is £4978. At the annual meeting last week, the Directors recommended the payment of the statutory dividends.

BY APPOINTMENT.

CARRON

IN the designing, planning, and construction of CARRON COOKERS, Carron Company have at their disposal the best skill and craftsmanship, coupled with the unlimited manufacturing resources of a highly trained organization dating back to the reign of George II.

This is YOUR guarantee that, in efficiency and reliability, Carron Cookers will do ALL and MORE than is claimed for them.

¶ **Catalogue free on request.**

CARRON COMPANY *Works:* CARRON, STIRLINGSHIRE, and at Phœnix Foundry, Sheffield.

Show-Rooms: London (City and West End), Liverpool, Manchester, Bristol, Birmingham, Newcastle-on-Tyne, Edinburgh, Glasgow, and Dublin.

Middlesbrough Gas and Electricity Profits.—The Finance Committee of the Middlesbrough Corporation have decided that no profits shall be taken from the gas and electricity undertakings in relief of the rates. Owing to the refusal of the Local Government Board to sanction capital expenditure during the war, it will be necessary to utilize the profits of these undertakings for any requirements this year.

Romford Gas and Coke Company, Limited.—At the half-yearly meeting of the Company, the Directors submitted a report which stated that the revenue profit carried to profit and loss account was £3954; the addition of sums of dividend and interest making the gross profit £4122 for the half year ended Dec. 31, to which had to be added the balance brought forward, giving an available total of £8226. The Directors recommended the payment of dividends at the rate of 13½ per cent. per annum on the original shares, and 10½ per cent. per annum on the "B" shares, both less income-tax, for the half year. Owing to the mild weather and continued lighting restrictions, there was a decrease of 3·07 per cent. in the sales of gas, as compared with the corresponding half of 1914. The Directors reported with regret the death last November of Mr. C. W. Boyns, the newly-appointed Manager, and the official changes resulting therefrom, as recorded in the "JOURNAL" at the time.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for March 15.]

NOS. 3307—3679.

COOK, G. A.—"Creosote oil for preservative purposes." No. 3597
GIBBONS BROS.—"Gas producers and furnaces." No 3423.
MASTERS, R.—See Gibbons. No. 3423.
PICARD, H. F. K.—"Production of metallic tar." No. 3668.
SULMAN, H. L.—See Picard. No. 3668.
VISSER, A. P.—"Distributing means in dry gas-meters." No. 3518
WILKES, A. H.—"Gas-burners." No. 3564.
WINN, P.—See Wilkes. No. 3564.

The Sub-Committee of the Middlesbrough Gas and Electricity Committee empowered to come to terms with the Tees-side Bridge and Engineering Works, regarding a lease by the latter of the old North Ormesby Gas-Works, have agreed to a term of twenty years, at a rental of £200 per annum. The gas-works have been idle since the amalgamation with Middlesbrough two years ago.

STOCK MARKET REPORT.

BUSINESS on the Stock Exchange in general was better last week than the week before. For one thing, there was more of it, though this accession of activity was chiefly perceptible in some of the minor markets and special lines. In the greater departments quietude prevailed; the disposition still being in favour of awaiting the development of State financial measures. But there was a nice cheerful tone, which intensified as the week progressed. The gilt-edged market was in good case; and War Loan and Consols were quite firm. Home Rails were little noticed until near the close, when they improved in response to demand. Americans moved irregularly. Canadians showed new strength; the increased railway traffic returns being remarkable. In the Foreign Market, a feature was the steadiness of the French loan, culminating in an advance towards the close. Brazilian was in demand in view of the country's improving conditions; but Japanese remained easy. South Africans had a temporary check through realization of profits in mid-week, but moved on again subsequently. The Miscellaneous Market showed many strong points. Rubber and oil were active and buoyant, copper fairly so, and shipping came into more notice than of late. In the Money Market there was not much change. Short loans hardened awhile and then relaxed; but discount rates closed firm. Among topics of interest, speculative discussion as to an issue of War Loan Bonus Bonds was damped by Mr. M'Kenna's announcement that they would be illegal. This obstacle, however, even if well-founded, is not irremediable; and the Government may perhaps find no difficulty in changing their minds. An important international financial development is the Anglo-Italian banking combination to promote commercial and industrial undertakings in Italy, which is very favourably received. The Stock Exchange Committee have sagaciously handled the alien-enemy-member question by dealing with individual cases on their merits. Business in the Gas Market shows no change in point either of volume or of values. Prices seem to have quietly settled down to a level at which bargainers are prepared to do business pending new developments.

Bargains done for cash during the week were as follows: On Monday, European 12⅜, 12 7/16, 12½, Gas Light ordinary 72¼, 72½, ditto preference 74, 74¼, 74½, Primitiva 2¼, ditto preference 3 1/16. On Tuesday, Bombay 5½, Gas Light ordinary 72¼, 72½, 72¾, Primitiva preference 7 1s. 10½d., 7 2s. 1½d., 7 2s. 6d., ditto (1911) 62½, 62⅝, South Metropolitan 75½, South Suburban debenture 90. On Wednesday, British debenture 67, Gas Light ordinary 72¼, ditto maximum 59½, ditto preference 74, 74¼, Imperial Continental 60, Primitiva 2¼, ditto preference 7 1s. 9d., South Suburban debenture 90. On Thursday, Brentford debenture 74, Brighton and Hove debenture 73, 73½, Continental Union preference 47, Gas Light ordinary 72½, 72¾, 72⅞, 73, ditto debenture 59½, 60, Liverpool 87½, 88, South Suburban 82, ditto debenture 90½. On Friday, European 12 5/16, 12 11/16, Gas Light ordinary 72½, 72¾, ditto preference 74, 74½, Liverpool 87¼, South Metropolitan 76. On Saturday, Gas Light ordinary 72¼, 72½, 72⅝, 72¾, Primitiva preference 7 1s. 10¼d.

The Bank rate is 5 per cent.—as fixed on Aug. 8, 1914.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div or Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.				£ s. d.	
1,551,868	Stk.	April 8	2½	5½	Alliance & Dublin Ord.	59—64	3 18 2	..
374,000	,,	July 10	4	4	Do. 4 p.c. Deb.	76—79	5 1 3	..
280,000	5	April 29	7½	3/-	Bombay, Ltd.	5½—6½	5 17 8	5½
60,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water { 10 p.c.	29—30	6 6 8	..
383,110	10	,,	7	7/-	B 7 p.c.	15—15½	4 10 4	..
115,000	10	,,	6	6/-	Pref. 6 p.c.	13½—14	4 5 9	..
153,740	—	—	—	4	4 p.c. Deb.	..	—	..
932,045	Stk.	Feb. 26	†14	†6/-	Brentford Consolidated	261—266	5 5 3	..
734,930	,,	,,	†11	55/-	Do. New	204—209	5 5 3	..
55,000	,,	,,	5	5	Do. 5 p.c. Pref.	109—111	4 10 1	..
221,400	,,	June 11	4	4	Do. 4 p.c. Deb.	91—93	4 6 0	74
217,380	Stk.	Feb. 26	11	10½	Brighton & Hove Orig.	208—213	5 8 4	..
244,200	,,	,,	8	7½	Do. A Ord. Stk.	154—159	5 0 8	..
630,000	20	Mar. 26	12½	22/6	British	44—45	5 11 1	..
120,000	Stk.	June 26	4	4	Do. 4 p.c. Deb. Stk.	88—90	4 8 11	67
245,771	Stk.	June 26	4	4	Buenos Ayres 4 p.c. Deb.	85—87	4 12 0	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	—	..
100,000	10	—	—	4/6	Do. 4½ p.c. Pref.	4—6	—	..
100,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. Stk.	70—75	6 0 0	..
157,150	Stk.	Feb. 26	5	5	Chester 5 p.c. Ord.	108—110	4 10 11	..
1,513,280	Stk.	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	106—108	5 1 2	..
660,000	,,	,,	5½	46/8	Do. 3½ p.c. do.	103—105	5 1 6	..
475,000	,,	June 11	3	3	Do. 3 p.c. Deb. Stk.	69½—71½	4 8 11	..
800 000	Stk.	,,	4	4	Continental Union, Ltd.	76—79	5 1 3	..
200 000	,,	,,	7	7	Do. 7 p.c. Pref.	115—118	5 18 8	47
278,400	—	—	—	11½	Croydon B and C 7 p.c.	..	—	..
492,270	Stk.	—	6	5½	Derby Con. Stk.	123—125	4 16 0	..
55,000	,,	—	4	4	Do. Deb. Stk.	102—104	3 16 11	..
1,002,180	10	July 29	10	10/-	European, Ltd.	17½—18	5 11 1	12⅝—12½
16,327,185	Stk.	Feb. 10	4/17/4	42/-	Gas Light and Coke { 4 p.c. Ord.	98—102	4 15 6	72½—73
2,600,000	,,	,,	8½	3½	3½ p.c. max.	76—79	4 8 7	5½
4,062,235	,,	,,	4	4	4 p.c. Con. Pref.	96—99	4 0 10	74—74½
4,674,850	,,	June 11	3	3	3 p.c. Con. Deb.	72½—74½	4 0 6	59½—60
130,000	,,	,,	10	10	10 p.c. Bonds	..	—	..
258,740	Stk.	Mar. 12	5	4½	Hastings & St. L. 3½ p.c.	87—89	5 12 4	..
70,000	10	April 29	11	6	Hongkong & China, Ltd.	16½—16¾	6 11 4	..
86,500	—	—	—	9½	Hornsey 7 p.c.	..	—	..
131,000	Stk.	Mar. 12	7½	7½	Ilford A and C	151—154	5 2 4	..
65,780	,,	,,	6⅜	5⅞	Do. B	115—118	5 8 0	..
65,500	,,	June 26	4	4	Do. 4 p.c. Deb.	92—94	4 5 1	..
4,940,000	Stk.	May 14	9	4½	Imperial Continental	150—160	5 12 6	60
1,235,000	Stk.	Feb. 12	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	4 1 5	..
235,242	Stk.	Mar. 12	6½	6½	Lea Bridge Ord. 5 p.c.	119—121	5 7 5	..
2,498,905	Stk.	Feb. 26	10	10	Liverpool 5 p.c. Ord. { A	211—213	4 18 11	87½—
					{ B	146—148	4 14 7	
306,083	,,	June 26	4	4	Do. 4 p.c. Pr. Deb. Stk.	..	—	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4¼—4⅝	6 9 9	..
250,000	100	April 1	4½	4½	Met. of Melbourne { 4½ p.c. Deb.	99—101	4 9 1	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	6 18 4	..
1,375,892	Stk.	July 29	4½	4½	Newc'tle&G'tesh'd Con.	98½—99½	4 10 6	..
529,705	Stk.	June 26	3½	3½	Do. 3½ p.c. Deb.	82—83	4 4 10	..
55,940	10	Feb. 26	7/14/0	7/8/8	North Middlesex 7 p.c.	14—16	5 2 8	..
800,000	Stk.	May 14	8	8	Oriental, Ltd.	117—122	6 11 2	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7¼—7⅝	6 9 0	..
60,000	50	Feb. 26	13	65/-	Portsea, Island B	128—131	4 19 8	..
100,000	50	,,	12	60/-	Do. C	118—121	4 19 2	..
52,000	50	,,	10	—	Do. D	..	—	..
249,980	5	April 29	8	—	Primitiva Ord.	5¾—6	6 18 4	2¼—2½
499,960	5	June 26	5	2/6	,, 5 p.c. Pref.	4⅝—5	5 0 0	71/9—78/9
521,600	100	June 2	4	4	,, 4 p.c. Deb.	91—93	4 6 0	..
—	—	—	—	4	,, ,, ,, 1911	..	—	62½—62⅝
346,198	Stk.	June 26	4	4	River Plate 4 p.c. Deb.	85—87	4 12 0	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.	10⅝—11	5 9 1	..
125,000	50	July 1	5	5	5 p.c. Deb.	47—49	5 2 0	..
135,000	Stk.	Mar. 12	10	10	Sheffield A	228—234	4 9 8	..
209,984	,,	,,	10	10	Do. B	222—234	4 9 8	..
523,500	,,	,,	10	10	Do. C	220—222	4 10 1	..
90,000	10	May 28	9	6/-	South African	10½—11½	7 16 6	..
6,609,895	Stk.	Feb. 10	5/4/0	44/-	South Met., 4 p.c. Ord.	111—113	4 16 8	75½—76
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb.	73½—74½	4 0 6	..
224,830	Stk.	Feb. 26	8½	8	South Shields Con. Stk.	157—159	5 6 11	..
952,795	Stk.	Feb. 26	6	48/4	S'th Suburb'n Ord. 5 p.c.	110—112	4 9 8	82
60,000	,,	,,	5	5	Do. 5 p.c. Pref.	..	—	..
135,000	—	—	—	48/4	Do. West Kent.	..	—	..
187,558	,,	June 26	5	5	Do. 5 p.c. Deb. Stk.	116—118	4 4 9	90—90½
629,740	Stk.	May 14	5	5	Southampton Ord.	99—102	4 18 0	..
120,000	Stk.	Feb. 12	7½	7½	Tottenham District { A 5 p.c.	135—138	5 8 8	..
782,275	,,	,,	6	6	B 8½ p.c.	115—117	5 2 7	..
181,255	,,	June 26	4	4	4 p.c. Deb.	87—89	4 9 11	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	8 6 8	..
149,900	10	July 1	5	5	Do. 5 p.c. Deb. Red.	93—95	5 5 8	..
236,476	Stk.	Mar. 12	5	5	Tynemouth, 5 p.c. max.	108½—109½	4 11 4	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	Stk.	Feb. 26	8⅜	78/9	Wandsworth A 5 p.c.	151—156	5 7 4	..
255,636	,,	,,	6⅞	63/9	,, B 3½ p.c.	129—134	5 2 7	..
108,075	,,	,,	5/17/8	55/1½	,, C 3¾ p.c.	110—115	5 2 0	..
352,000	,,	,,	6¼	57/6	Wimbledon 5 p.c.	117—122	5 0 5	..
98,000	,,	,,	6⅝	63/9	Epsom 5 p.c.	121—126	5 5 2	..
88,416	,,	June 26	3	3	3 p.c. Deb. Stk.	66—69	4 6 11	..

Ex. Div. † Paid on Old 10 p.c. and 7 p.c. Standard Stocks.

Annie Baker, aged sixty, of Hove, who had suffered from depression, committed suicide by lying down in front of a gas-oven, the taps of which were turned full on, but not lighted.

A copy is to hand of "Proctor's Tables of Equivalents, Gauge Numbers, and Discount Book," by Messrs. Edward Le Bas and Co., Dock House, Billiter Street, E.C. Of a size suitable for the waistcoat pocket, the book possesses no drawback to set against its obvious advantages. Every discount is shown from 2½ to 97½ per cent., by increases of 2½ per cent.; other figures included being 1¼, 33⅓, 66⅔, and 98¾. Every penny is shown up to 10s.; every 3d. from that to 20s. 6d.; and every 1s. from £1 1s. to £5. Useful tables, also, are the English equivalents of metric weights and measures.

In presenting the balance-sheet of the Company as on Jan. 31, the Directors of Messrs. C. & W. Walker, Limited, report that the profit for the past year, after charging Directors' fees and depreciation on buildings and plant and strengthening reserves, amounts to the sum of £14,779. After adding the balance brought forward, there is a sum of £26,684 standing to the credit of profit and loss account, which the Directors recommend be dealt with as follows: Dividend for twelve months of 5½ per cent. on the preference shares, and 10 per cent. (free of income-tax) on the ordinary shares, £7129; to payment of a bonus of 1s. per share on the ordinary shares (free of income-tax), £2464; to carry to reserve (making it £45,000), £5000; leaving to be carried forward, £12,091.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

Gas and Water Engineer. Leigh (Lancs.) Corporation. Applications by March 23.
Manager (Warehouses). No. 302, Smith's Advertising Agency.
Showroom Manager, &c. Braintree Gas-Works.
Foreman. Bombay Gas Company. Applications to London Office (Moorgate Station Chambers) by April 4.
Boiler Attendant. Grays Gas-Works.
Stoker and Handy Man. No. 6164.

Meeting.

British Gaslight Company. 11, George Yard, Lombard Street, E.C. March 29. Twelve o'clock.

Plant, &c. (Second Hand), for Sale.

Steavenson and Co., Wandsworth.

TENDERS FOR

Ammoniacal Liquor Concentrating Plant.

Warrington Gas Department. Tenders by March 27.

Coal.

Forfar Gas Corporation. Tenders by April 7.
Macclesfield Gas Department. Tenders by April 15.
Taunton Gas Company. Tenders by March 28.

Fire Clay Goods.

Mountain Ash Urban District Council. Tenders by April 4.
Scunthorpe Gas Department. Tenders by April 10.

Oil for Gas Making.

Ashford Urban District Council. Tenders by March 29.

Oxide of Iron.

Salford Gas Department.
Warrington Gas Department. Tenders by March 27.

Tar.

Leigh (Lancs.) Gas Department. Tenders by March 23.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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See Illustrated Advertisement, Feb. 22, p. 440.

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